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DEVOTED TO TEXTILE WET-PROCESSING

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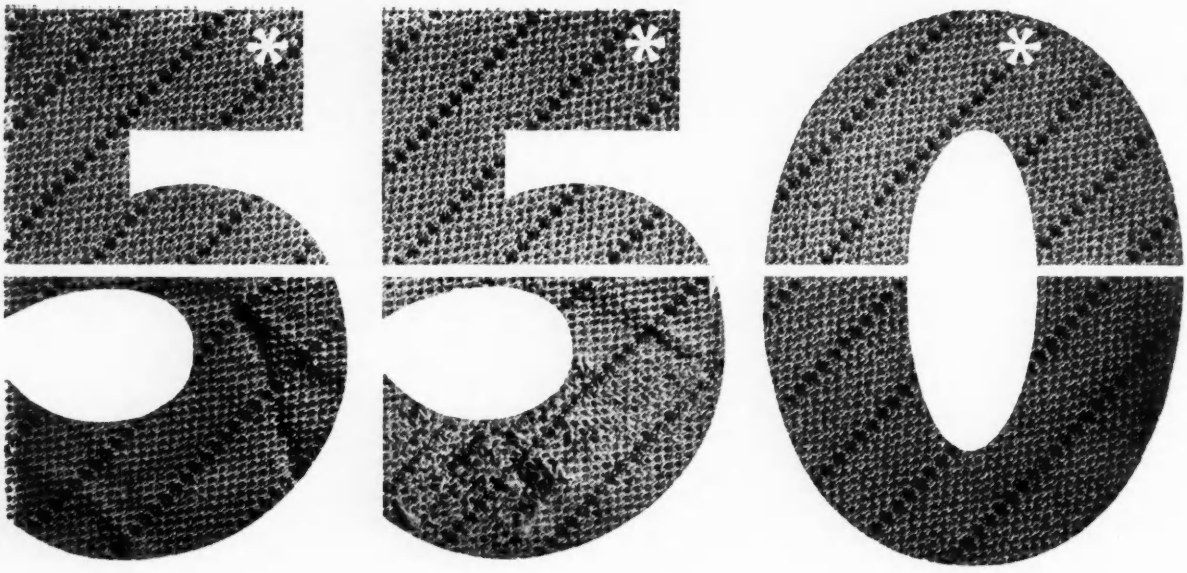

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AMERICAN
DYESTUFF REPORTER
Volume 46 September 9, 1957 Number 18

A NOMOGRAPH FOR CALCULATING COLOR DIFFERENCES USING THE ADAMS-NICKERSON EQUATION

DOUGLAS P ADAMS, ROLAND E DERBY, JR, ROXY E ERNSBERGER, and RICHARD B SOLO
Massachusetts Institute of Technology
Cambridge, Mass

This paper describes a nomographic method of evaluating small color differences according to the Adams-Nickerson equation (1). This nomograph permits direct evaluation of ΔE from ΔX, ΔY, and ΔZ without the use of tables or calculation. The average error introduced by use of the graphical technique is 2%.

INTRODUCTION

THE color of an object may be physically specified in the following manner (2):

1) The reflection or transmission characteristics of the object are determined by means of a spectrophotometer.
2) These results are combined either by calculation or automatic integration (3) with data on the nature of the illuminant and the spectral sensitivity of an average observer. This data has been standardized by the International Commission on Illumination (CIE) (2).

The results of the preceding computations are embodied in three numbers (X, Y, Z) called tristimulus values. Two colors having the same tristimulus values are matches under the conditions specified.

The determination of tristimulus values is a rather straightforward procedure. Unfortunately, knowledge of these values alone for two samples is insufficient to state quantitatively the visual color difference between them.

This complication is introduced by the fact that equal linear distances in CIE (X, Y, Z) space are not visually equal. Various methods of circumventing this difficulty have been proposed in the last 20 years. MacAdam (4) has indicated that, based on experimental visual sensitivities, no plane color diagram can be plotted in which visual equalities correspond to equal linear distances.

Several nonlinear transformations have been developed to solve the problem. These have been critically reviewed by Judd (5). Applications involving colored surfaces similar to textile fabrics have, in most cases, utilized the method of "MacAdam's Ellipses" (6) or the Adams-Nickerson Equation (1). The former is most useful where the results are to be plotted in terms of color coordinates. In addition, it should be noted that the results based on the MacAdam data are in somewhat better agreement with visual examination.

The Adams-Nickerson Equation defines a color space in terms of V_x, V_y, and V_z which are obtained from the tristimulus values X, Y, Z. A color difference in this space is defined by the following equation:

$$\Delta E = 40\left\{[0.23\Delta V_y]^2+[\Delta(V_x-V_y)]^2+[0.4\Delta(V_z-V_y)]^2\right\}^{\frac{1}{2}}$$

This equation has been useful in evaluating the color degradation of textiles due to light or chemical action. It has also proven satisfactory in evaluating color gradients which arise in textiles during processing. Applications to paint and plastic color differences also yield good correlation with visual results.

Calculation of a color difference with this equation involves considerable computation. First, V_x, V_y, and V_z must be determined from tables for the particular values of X, Y, Z of the samples being compared. Then the mathematical operations indicated in the equation must be carried out.

Since this rather involved operation is repeated frequently in a color laboratory it becomes economical to consider methods of reducing both the labor involved and the possibility of error.

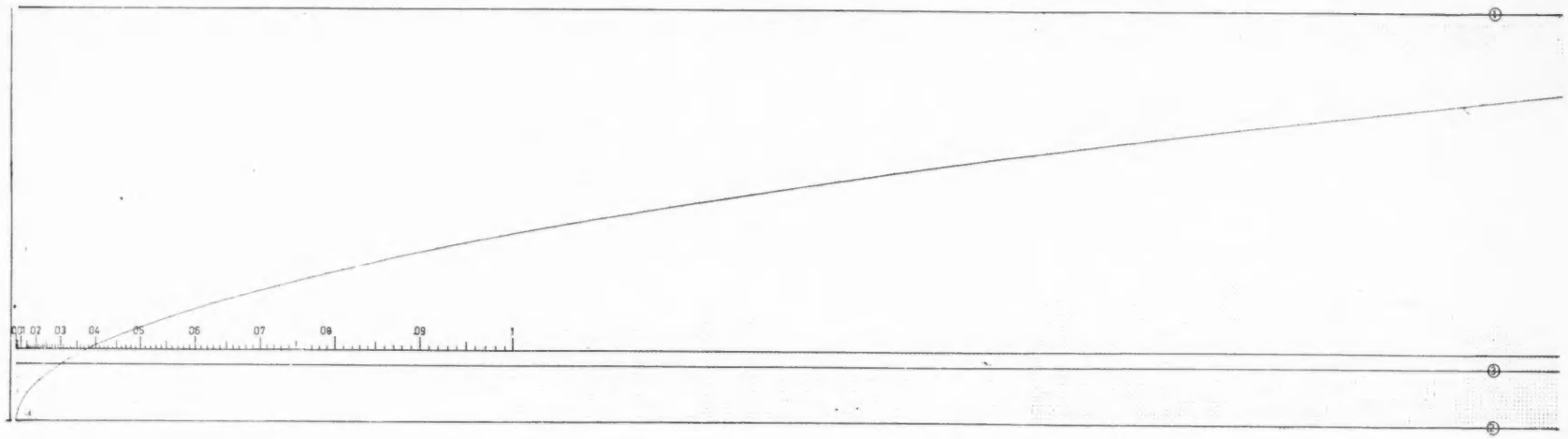
Buc (7) has developed tables giving presolutions to the terms in equation 1 for all possible values of V. Derby (8) constructed a nomograph which performed the square-root of the sum of the squares calculation indicated by the equation for a limited range of values. DeJager (9) has recently developed a slide rule based on simplification of the basic functional relation between X, Y, Z, and V_x, V_y, V_z. Slide rules or nomograms have been constructed for other nonlinear transformations of color space (10, 11, 12). Very recently a simplified coordinate system based on a "cube-root" value function has been developed (13). This provides somewhat simpler analytical expressions and should be useful. A slide rule based on this system and the Colormaster colorimeter have been developed based on approximate solutions. The accuracy is stated to be of the order of 10%.

The most useful nomographic solution to the problem would avoid as many mathematical steps as possible since these are sources of error in repetitive operations.

The nomograph described below fulfills this objective as only the values of X, Y, Z of the two samples are required. All subsequent operations leading to the solution are performed graphically.

CONSTRUCTION AND USE OF NOMOGRAPH

In the construction of the charts, standard nomographic methods were applied to the color difference equa-

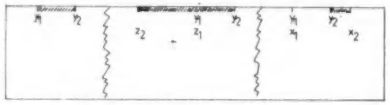


$$\frac{\Delta E}{F} = \left| [0.23\Delta Y]^2 + [\Delta(X-Y)]^2 + [0.4\Delta(Z-Y)]^2 \right|^{\frac{1}{2}}$$

TO SOLVE THE EQUATION FOR $\frac{\Delta E}{F}$

① USING THE THREE SCALE SHEETS, MARK OFF THE LENGTHS ΔY, Δ(Z-Y), AND Δ(X-Y). USE A PIECE OF PAPER, MARKING OFF THE DISTANCE BETWEEN Y_1 AND Y_2 IN THREE PLACES.

TO ONE OF THESE ΔY'S ALGEBRAICALLY ADD THE DISTANCE ΔZ BY PLACING THE Z_1 UPON THE Y_1 AND THEN MARKING OFF Z_2. THIS IS Δ(Z-Y). SIMILARLY FIND Δ(X-Y).



② LAY OFF THE LENGTHS ΔY, Δ(Z-Y), AND Δ(X-Y) UPON THE VERTICAL LINE AT THE LEFT-HAND EDGE OF THIS CHART. CARRY THE THREE POINTS THUSLY DETERMINED OUT PARALLEL TO THE BASE LINE OF THE CHART UNTIL THEY INTERSECT THE CURVE. AT THESE POINTS PROJECT ΔY AND Δ(Z-Y) STRAIGHT UPWARD TO LINE ①. PROJECT Δ(X-Y) DOWNWARD TO LINE ②.

CONNECT THE POINT Δ(Z-Y) ON LINE ① TO POINT Δ(X-Y) ON LINE ② AND MARK THE POINT THIS LINE CROSSES LINE ③. CONNECT THIS POINT ON LINE ③ TO ΔY ON LINE ① AND READ THE ANSWER ON THE SCALED ANSWER LINE.

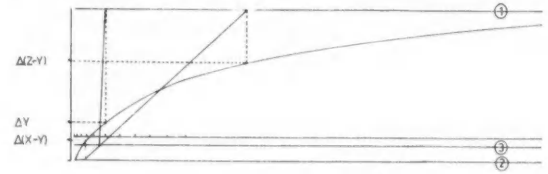


Figure 1

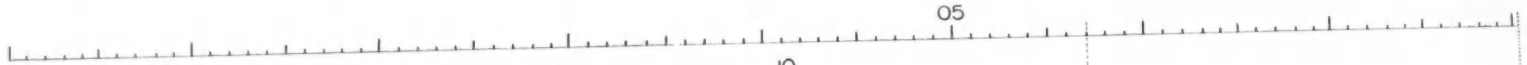


Figure 1

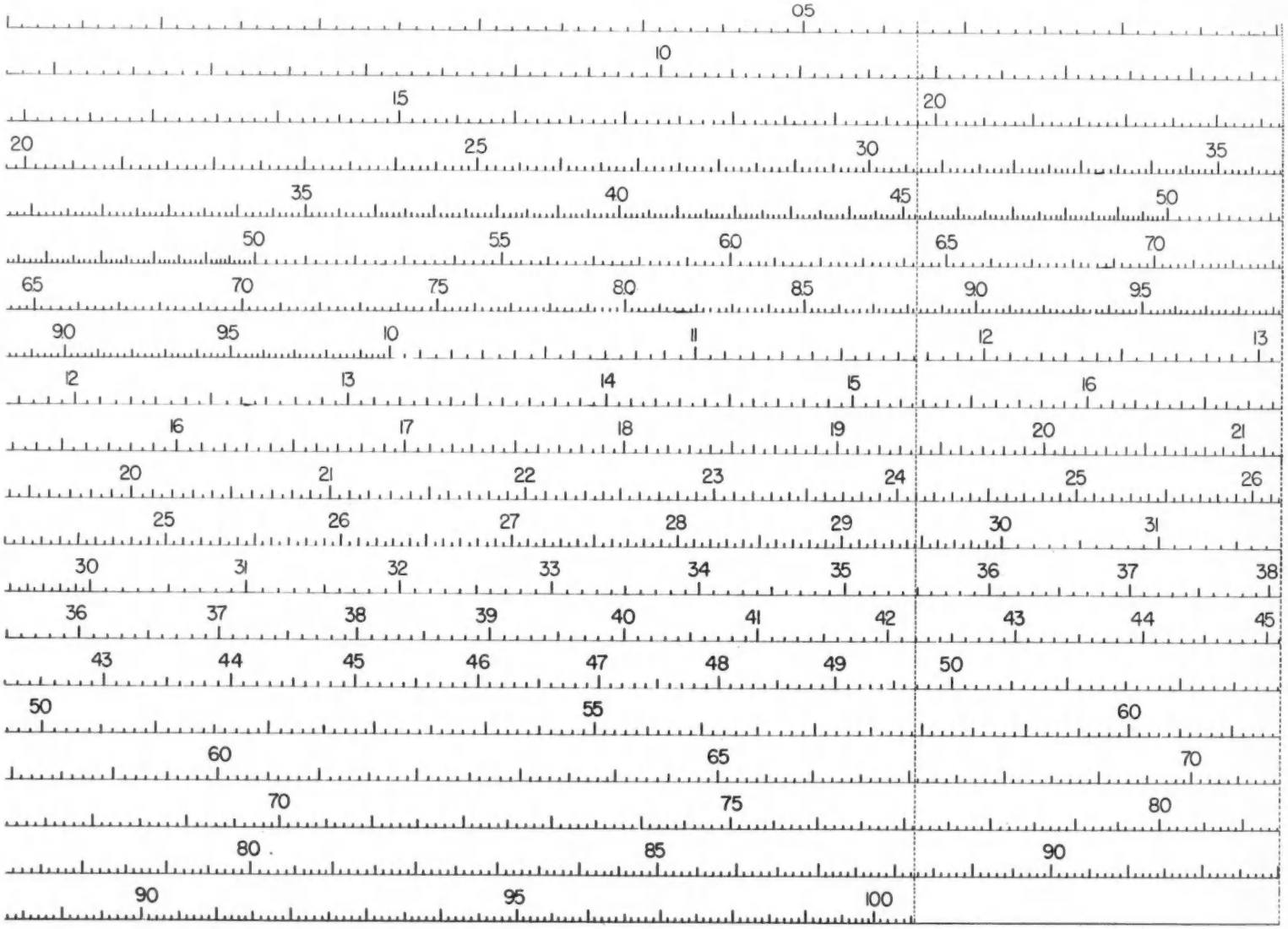


Figure 2

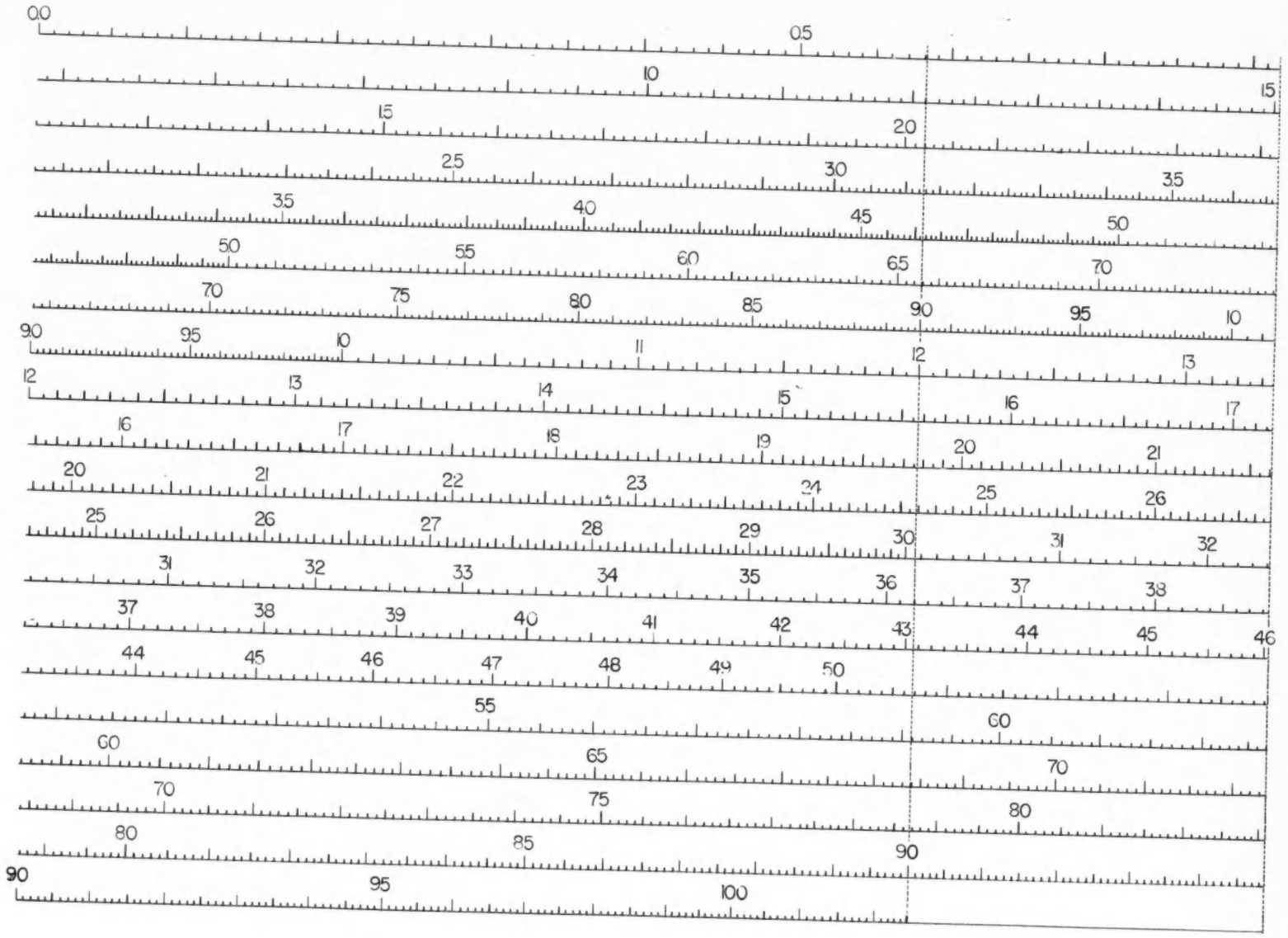
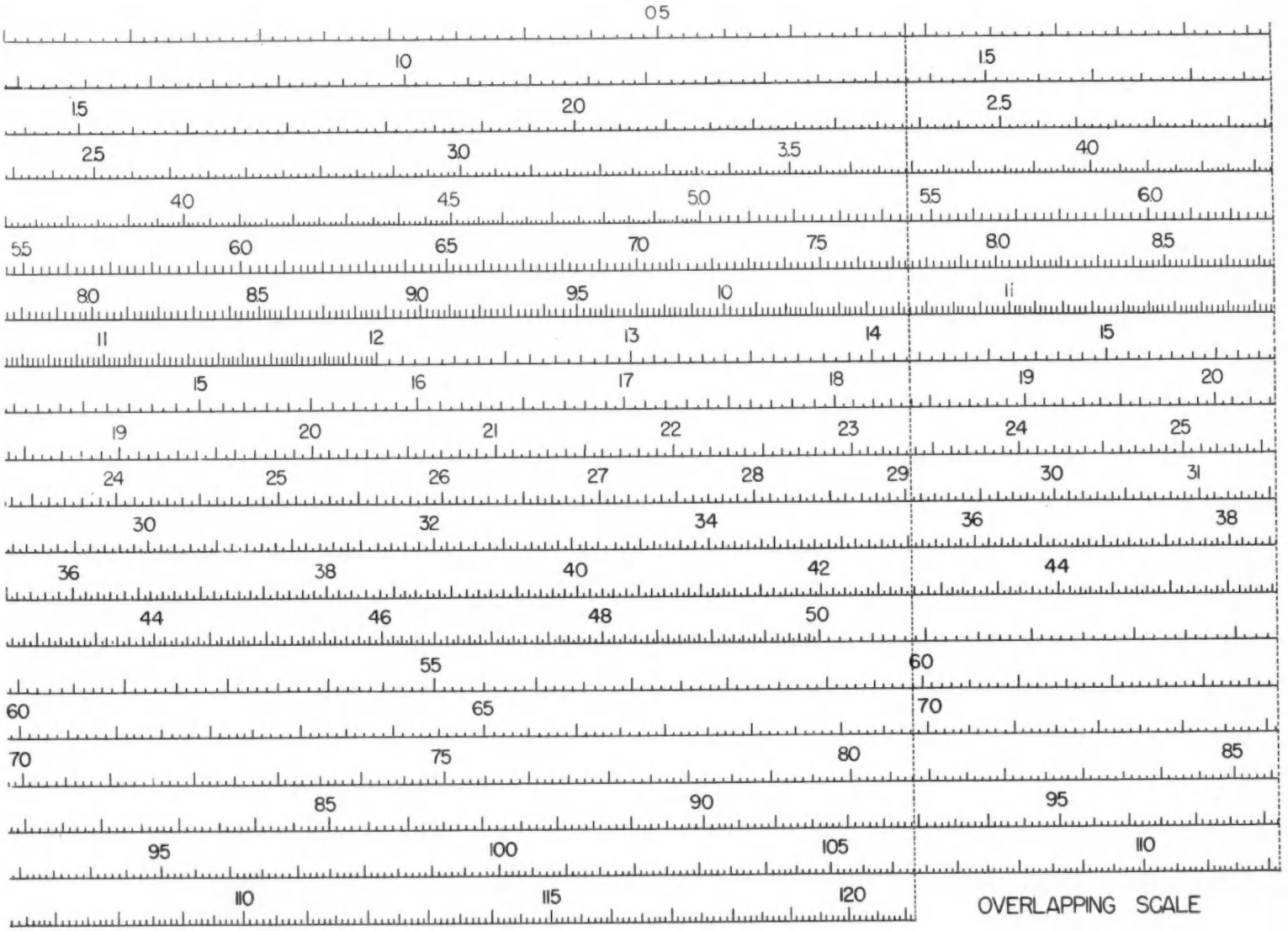


Figure 3

SCALE SHEET FOR ΔY

OVERLAPPING SCALE

Figure 3



SCALE SHEET FOR ΔZ

Figure 4

tion. It was soon discovered that the wide range of the tristimulus values, together with the small values obtained for the differences, shorten the effective answer scale to an extent which made accurate readings impossible. This problem was resolved by using three separate large scale charts. The factor F was not introduced into the right side of the equation because different applications may require different factors. The desired factor can be simply incorporated into the nomograph by proper multiplication of the values on the answer scale. The use of the nomograph is explained in detail below and in Figure 1.

First the three scale sheets (Figures 2, 3, 4) are used—the distance $\overline{Y_1\ Y_2}$ is marked off on a sheet of paper in three places. The distance $\overline{Z_1\ Z_2}$ is added to one of the $\overline{Y_1\ Y_2}$ values by placing Z_1 on Y_1 and marking off Z_2. This method of placing Z_1 on Y_1 assured the *algebraic* addition necessary and makes an error in sign impossible. The distance $\overline{Y_2\ Z_2}$ is the Δ(Z-Y)* desired and Δ(X-Y) is found in a similar manner. Once familiarity with the chart is gained, $\overline{Y_1\ Y_2}$ need not be marked off three times but only once. $\overline{Z_1\ Z_2}$ and $\overline{X_1\ X_2}$ may then be added to this one ΔY, but a little care must be used or an error could be made by using this short-cut. The use of different colored pencils is helpful.

Next, lay off these lengths ΔY, Δ(Z-Y) and Δ(X-Y)* upon the vertical line at the left of Figure 1—from the bottom up. Project the three points thus determined out parallel to the base line of the chart until they intersect the curve. Then project points ΔY and Δ(Z-Y) vertically upward to line 1; point Δ(X-Y) downward to line 2. Connect the point Δ(Z-Y) on line to point Δ(X-Y) on line 2 and mark the point where this line crosses line 3. Connect this point on line 3 to ΔY on line 1 and read the answer on the scaled answer line.

These instructions, which at first glance seem quite involved, become simple and automatic with only one or two trials. The average time per calculation to make the ten calculations shown in Table I was less than 5 minutes. This table shows ten calculated values compared with values obtained graphically. The percent difference between the two is also given. These values cover the range commonly found in practice and the error is seen to be acceptable throughout the range. These results are typical of those obtained in use for a year in this laboratory. In certain cases where the construction lines are very long, careful drafting is required to avoid large errors. Even with care, it is possible to make a 10% error when these conditions arise.

*Note: Δ (V_X-V_Y) and Δ (V_Z-V_Y) are abbreviated Δ (X-Y) and Δ (Z-Y) respectively.

TABLE I

Calculation	Calculated CD	Nomogram CD	Percent Difference
1	0.400	0.400	0
2	0.432	0.448	3.7
3	0.488	0.520	6.8
4	0.592	0.592	0
5	0.668	0.680	1.8
6	0.712	0.720	1.1
7	0.720	0.720	0
8	0.756	0.760	0.5
9	0.820	0.840	2.4
10	1.000	1.028	2.8
		Average Error =	1.9%

CONCLUSION

The nomogram developed in this paper offers three major advantages over calculation with tables. These are as follows:

1) It saves time.
2) It minimizes the chance of errors in looking up values and making calculations.
3) Interpolation is avoided since the scales can be read with sufficient accuracy.

In addition, the agreement between calculated and graphical results is better than the inherent limitations of the color difference equation.

Note: The nomogram and charts shown in this presentation are too small for accurate work. For this purpose large charts have been prepared. It is suggested that any person interested in using the nomograph described above for practical calculations, contact Roland E Derby, Jr, The Derby Co, Inc, 49 Blanchard St, Lawrence, Mass, regarding large scale charts.

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ERRATA

YOUR attention is directed to the following errors, which have appeared in recent issues.

In the article, "Selective Solvents for Analyzing Textile Fiber Mixtures", by Siegfried S Praeger, beginning on page 497 of the July 15th issue, the word "room" under the column "Dimethylformamide" in Table I is in error. The word "boil" should be substituted to indicate temperature.

In the article "Comparisons of Wrinkle-resistant Finishes for Cotton", by T F Cooke et al, beginning on page P585 of the August 12th issue, errors appear on pages P588 and P593.

On page P588, first column, the first sentence of the paragraph beginning with the word "Ordinarily" should read . . . "Ordinarily one can show a relationship between one independent variable and a dependent variable by means of a graph of the two variables. The words "and a dependent variable" were inadvertantly omitted.

On page P593, in the paragraph beginning with the words "Although the wrinkle recovery . . .", the second and third sentences erroneously express wrinkle recovery values in percent. These sentences should read correctly as follows: "As these graphs show, the EU finish loses from 40-60° in wrinkle recovery after 16 washes. The UF finish has low initial wrinkle recovery and loses about 20° in these washes."

FUTURE PAPERS

The following papers have been accepted for publication outside the *Proceedings of AATCC*:

"New Aspects of the Pad-Roll System", Bertil Mellbin, AB Svenska Textilmaskinfabriken

"Interfacial Film Phenomena in the Dyeing of Cellulose Acetate", John H Skinkle and Edwin C Sherburne, Lowell Technological Institute

"Textile Properties and Fiber Markets", Ernest R Kaswell, Fabric Research Laboratories, Inc

"The Practical Aspects of Neutral Grease Wool Scouring", E J McNamara, Jr, Rohm & Haas Co

"Design of a Luster Meter for Quality Control", H A Thompson and T M Smith, Tennessee Eastman Co, and W I Kaye, Beckman Instruments, Inc

"A Conservative Approach to the Development of New Detergents for Raw Wool Scouring", Fritz F Kobayashi, Lowell Technological Institute Research Foundation

Proceedings of the
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September 9, 1957

COLOUR INDEX—CROSS INDICES

III. New Colour Index Names and Numbers to Old Names and Numbers

EDITOR'S NOTE: This concludes the ***Colour Index*** Cross Indices, the first part of which appeared in the August 26th issue, pages P610-P624. We regret an error which appeared on page P616 of said issue, in which an asterisk followed the column head "New CI Name." This should have appeared after the column head "Old CI Name" (see footnote).

DIRECT DYES

New CI Name	*New CI No.*	*Old CI Name**	*Old CI No.*
Direct Black	1 31595	—	—
Direct Black	2 31575	—	—
Direct Black	3 27710	Neutral Gray G	CI 267
Direct Black	4 30245	Direct Deep Black RW Ex	CI 582
Direct Black	5 —	—	—
Direct Black	6 —	—	—
Direct Black	7 —	(Direct Fast Black CGW)	—
Direct Black	8 —	(Chloramine Black 3G, 3GR)	Pr 565
Direct Black	9 31560	Columbia Black FF Ex	CI 539
Direct Black	9 31565	Columbia Black FF Ex	CI 539
Direct Black	10 31545	—	—
Direct Black	11 30240	—	—
Direct Black	12 —	—	—
Direct Black	13 30025	—	—
Direct Black	14 30345	—	—
Direct Black	15 22620	—	—
Direct Black	16 —	—	—
Direct Black	17 27700	Zambesi Black D	Pr 201
Direct Black	18 —	—	—
Direct Black	19 35255	Naphtamine Fast Black RS	CI 619
Direct Black	20 30395	—	—
Direct Black	21 31580	—	—
Direct Black	22 35435	Cotonerol	Pr 372
Direct Black	23 —	—	—
Direct Black	24 31925	—	—
Direct Black	25 —	—	—
Direct Black	26 —	—	—
Direct Black	27 31810	—	—
Direct Black	28 35760	—	—
Direct Black	29 22580	Diamine Black RO	CI 395
Direct Black	30 23675	—	—
Direct Black	31 —	—	—
Direct Black	32 35440	—	—
Direct Black	33 —	—	—
Direct Black	34 35075	—	—
Direct Black	35 —	—	—
Direct Black	36 31665	Cotton Black 3G	Pr 64
Direct Black	37 —	(Pontamine Black AWG)	Pr 565
Direct Black	38 30235	Direct Deep Black EW Ex	CI 581
Direct Black	39 —	—	—
Direct Black	40 31760	—	—
Direct Black	41 30260	Chrome Leather Fast Black S Conc	Pr 371
Direct Black	42 —	—	—
Direct Black	43 —	—	—
Direct Black	44 —	—	—
Direct Black	45 —	(Chloramine Green Black G)	—
Direct Black	46 —	—	—
Direct Black	47 —	—	—
Direct Black	48 34000	—	—
Direct Black	49 34155	—	—
Direct Black	50 —	—	—
Direct Black	51 27720	Benzo Fast Black L	Pr 24
Direct Black	52 —	—	—
Direct Black	53 —	—	—
Direct Black	54 —	—	—
Direct Black	55 —	(Pontamine Fast Gray 2GL)	—
Direct Black	56 34170	Diphenyl Fast Gray B	CI 403
Direct Black	57 —	—	—
Direct Black	58 —	—	—
Direct Black	59 —	(Nyalite Fast Gray 3GL)	—
Direct Black	60 —	(Amanil Rayon Black JG)	—
Direct Black	61 —	(Chlorantine Fast Gray GRL)	—
Direct Black	61 —	(Solophenyl Gray 2GLA)	—
Direct Black	62 —	—	—
Direct Black	63 —	—	—
Direct Black	64 —	—	—
Direct Black	65 —	—	—
Direct Black	66 —	—	—
Direct Black	67 —	(Pontamine Fast Gray BL)	—
Direct Black	67 —	(†Pyrazoline Gray GL)	—
Direct Black	67 —	(†Solantine Gray GL)	—
Direct Black	68 —	—	—
Direct Black	69 —	—	—
Direct Black	70 —	—	—
Direct Black	71 25040	Sirius Supra Gray VGL	Pr 379
Direct Black	72 —	—	—
Direct Black	73 —	—	—
Direct Black	74 34180	Benzo Fast Gray BL	Pr 416
Direct Black	75 35870	Sirius Supra Gray R	Pr 96
Direct Black	76 35865	—	—
Direct Black	77 35860	—	—
Direct Black	78 30015	Zambesi Black V	Pr 202
Direct Black	79 —	—	—
Direct Black	80 31600	Oxydiaminogen OB	Pr 147
Direct Black	81 —	—	—
Direct Black	82 —	—	—
Direct Black	83 31850	Diazo Blue Plack RS	CI 552
Direct Black	84 —	—	—
Direct Black	85 —	—	—
Direct Black	86 24115	—	—
Direct Black	87 24110	—	—
Direct Black	88 —	—	—
Direct Black	89 —	—	—
Direct Black	90 21530	—	—
Direct Black	91 30400	—	—
Direct Black	92 —	—	—
Direct Black	93 —	—	—
Direct Black	94 —	—	—
Direct Black	95 —	—	—
Direct Black	96 27770	—	—
Direct Black	97 35810	—	—
Direct Black	98 —	—	—
Direct Black	99 —	(Azoform Black B)	—
Direct Blue	1 24410	Diamine Sky Blue FF	CI 518
Direct Blue	2 22590	Diamine Black BH	CI 401
Direct Blue	3 23705	Oxamine Blue 4R	CI 471
Direct Blue	4 24380	Chicago Blue B	CI 516
Direct Blue	5 —	—	—
Direct Blue	6 22610	Benzo Blue BB	CI 406

*This column also includes the prototype names of many foreign dyes introduced since the old *CI* was published; also the names of domestic dyes which have no foreign Prototypes. The latter dyes are in paretheses.

†Similar to but not identical.

New CI Name	New CI No.	Old CI Name	Old CI No.
Direct Blue 7	—	—	—
Direct Blue 8	24140	Benzo Azurine G	CI 502
Direct Blue 9	24155	—	—
Direct Blue 10	24340	Dianil Blue G	CI 508
Direct Blue 11	30350	—	—
Direct Blue 12	24170	—	—
Direct Blue 13	—	—	—
Direct Blue 14	23850	Benzo Blue 3B	CI 477
Direct Blue 15	24400	Benzo Sky Blue	CI 520
Direct Blue 16	22475	—	—
Direct Blue 17	—	—	—
Direct Blue 18	—	Chloramine Copper Blue 4G	Pr 525
Direct Blue 19	22485	—	—
Direct Blue 20	—	—	—
Direct Blue 21	23710	Benzo Blue BX	CI 472
Direct Blue 22	24280	Benzo Blue RW	CI 512
Direct Blue 23	24405	(Formanil Indigo Blue)	Pr 712
Direct Blue 24	—	(Pontamine Navy Blue DB)	Pr 569
Direct Blue 25	23790	Benzo New Blue 5B	CI 466
Direct Blue 26	31930	Benzo Chrome Black Blue B	Pr 20
Direct Blue 27	23750	Trisulfon Blue R	CI 464
Direct Blue 28	—	—	—
Direct Blue 29	27890	—	—
Direct Blue 30	31955	Benzo Fast Blue B	CI 576
Direct Blue 31	23690	—	—
Direct Blue 32	—	—	—
Direct Blue 33	31635	—	—
Direct Blue 34	32055	—	—
Direct Blue 35	24145	—	—
Direct Blue 36	24150	—	—
Direct Blue 37	24270	—	—
Direct Blue 38	30090	—	—
Direct Blue 39	30390	—	—
Direct Blue 40	—	—	—
Direct Blue 41	42700	Brilliant Sky Blue 5G	CI 710
Direct Blue 42	22505	—	—
Direct Blue 43	30205	—	—
Direct Blue 44	—	—	—
Direct Blue 45	24310	—	—
Direct Blue 46	—	—	—
Direct Blue 47	—	(Calcomine Blue DR)	—
Direct Blue 48	22565	—	—
Direct Blue 49	22540	—	—
Direct Blue 50	24205	Benzo Azurine 3G	CI 503
Direct Blue 51	30340	—	—
Direct Blue 52	—	—	—
Direct Blue 53	23860	—	—
Direct Blue 54	27960	—	—
Direct Blue 55	27940	Brilliant Congo Blue BFL	Pr 417
Direct Blue 56	—	—	—
Direct Blue 57	—	—	—
Direct Blue 58	22490	—	—
Direct Blue 59	—	—	—
Direct Blue 60	23810	—	—
Direct Blue 61	—	Chloramine Copper Blue 3G	†Pr 524
Direct Blue 62	—	(Direct Neutral Blue G)	—
Direct Blue 63	31910	Benzo Fast Blue R	CI 567
Direct Blue 64	22595	Benzo Cyanine R	CI 405
Direct Blue 65	24220	—	—
Direct Blue 66	—	Pontamine Fast Blue 8GL	Pr 27
Direct Blue 67	27925	Benzo Fast Heliotrope	CI 319
Direct Blue 68	—	—	—
Direct Blue 69	34210	—	—
Direct Blue 70	34205	—	—
Direct Blue 71	34140	Diamine Fast Blue FFB	Pr 71
Direct Blue 72	34145	—	—
Direct Blue 73	—	—	—
Direct Blue 74	—	Durazol Fast Blue 3RS	Pr 535
Direct Blue 75	34220	Chlorantine Fast Blue 2GL	Pr 46
Direct Blue 75	34220	Benzo Fast Blue FR	CI 533
Direct Blue 76	—	Chlorazol Blue 5GKS	Pr 432
Direct Blue 77	—	—	—
Direct Blue 78	34200	Benzo Fast Blue 4GL	Pr 26
Direct Blue 79	—	—	—
Direct Blue 80	—	(Superlitefast Blue RL)	Pr 613
Direct Blue 81	34215	Chlorantine Fast Blue 3GLL	Pr 594
Direct Blue 82	34130	—	—
Direct Blue 83	34230	—	—
Direct Blue 84	23160	—	—
Direct Blue 85	—	—	—
Direct Blue 86	74180	Sirius Supra Turquoise Blue GL	Pr 278
Direct Blue 87	74200	—	—
Direct Blue 88	—	(Amanil Fast Blue FFG)	—
Direct Blue 89	—	—	—
Direct Blue 90	—	—	—
Direct Blue 91	—	—	—
Direct Blue 92	—	—	—
Direct Blue 93	22810	—	—
Direct Blue 94	—	—	—
Direct Blue 95	23150	—	—
Direct Blue 96	21620	—	—
Direct Blue 97	—	—	—
Direct Blue 98	23155	Sirius Supra Blue FBGL	Pr 443
Direct Blue 99	—	(Fastusol Blue LFGL)	—
Direct Blue 100	—	(Superlitefast Blue GL)	Pr 611
Direct Blue 101	—	(Nyalite Fast Blue 8G)	—
Direct Blue 102	—	(Nyalite Fast Blue RL)	—
Direct Blue 103	—	—	—
Direct Blue 104	—	(Pontamine Fast Blue BLL)	—
Direct Blue 105	—	(Pontamine Fast Blue CPL)	—
Direct Blue 106	51300	—	—
Direct Blue 107	51315	—	—
Direct Blue 108	51320	—	—
Direct Blue 109	51310	—	—
Direct Blue 110	34125	—	—
Direct Blue 111	26680	—	—
Direct Blue 112	—	(Pyrazoline Blue CF 2B)	—
Direct Blue 113	—	—	—
Direct Blue 114	—	—	—
Direct Blue 115	—	—	—
Direct Blue 116	27980	—	—
Direct Blue 117	—	—	—
Direct Blue 118	—	—	—
Direct Blue 119	—	—	—
Direct Blue 120	34085	Diaminogen Blue N2B	Pr 74
Direct Blue 120A	34090	Diaminogen Blue N2B	Pr 74
Direct Blue 121	34095	—	—
Direct Blue 122	27115	—	—
Direct Blue 123	26705	—	—
Direct Blue 124	27050	—	—
Direct Blue 125	—	—	—
Direct Blue 126	34010	Diaminogen Blue NA	Pr 529
Direct Blue 127	34080	—	—
Direct Blue 128	27140	—	—
Direct Blue 129	27095	—	—
Direct Blue 130	27110	Diazo Brilliant Blue 2BL	Pr 436
Direct Blue 131	35085	—	—
Direct Blue 132	27725	Diaminogen Ex	CI 317
Direct Blue 133	34005	Diazo Indigo Blue 4RL	Pr 87
Direct Blue 134	—	—	—
Direct Blue 135	34290	—	—
Direct Blue 136	24065	Diazo Sky Blue B	Pr 90
Direct Blue 137	—	—	—
Direct Blue 138	26650	Diazo Sky Blue 3GL	Pr 91
Direct Blue 139	—	—	—
Direct Blue 140	27640	—	—
Direct Blue 141	—	—	—
Direct Blue 142	—	—	—
Direct Blue 143	—	(Pontamine Diazo Blue 3G)	—
Direct Blue 144	—	—	—
Direct Blue 145	27895	—	—
Direct Blue 146	—	—	—
Direct Blue 147	—	†Benzo Copper Blue B	†Pr 22
Direct Blue 148	34135	—	—
Direct Blue 149	28350	—	—
Direct Blue 150	35110	—	—
Direct Blue 151	24175	Benzo Copper Blue B	Pr 22
Direct Blue 151	24175	Oxamine Blue B	CI 515
Direct Blue 152	24360	—	—
Direct Blue 153	—	—	—
Direct Blue 154	—	—	—
Direct Blue 155	—	—	—
Direct Blue 156	—	—	—
Direct Blue 157	31680	—	—
Direct Blue 158	24555	—	—
Direct Blue 159	35775	—	—
Direct Blue 160	—	—	—
Direct Blue 161	—	—	—
Direct Blue 162	35770	Coprantine Blue RLL	Pr 596
Direct Blue 163	33560	—	—
Direct Blue 164	24550	—	—
Direct Blue 165	—	—	—
Direct Blue 166	23165	—	—
Direct Blue 167	24560	—	—
Direct Blue 168	24185	—	—
Direct Blue 169	—	(Niagara Fast Copper Blue EG)	—
Direct Blue 170	—	—	—
Direct Blue 171	—	—	—
Direct Blue 172	—	—	—
Direct Blue 173	—	—	—
Direct Blue 174	—	—	—
Direct Blue 175	35465	(Formanil Blue BB)	Pr 675
Direct Blue 176	35460	(Formanil Blue 3G, 5G)	Pr 676
Direct Blue 177	22625	(Formanil Blue 4R)	Pr 677
Direct Blue 178	—	—	—
Direct Blue 179	—	—	—
Direct Blue 180	—	(Nyaform Blue 2B)	Pr 606
Direct Blue 181	—	—	—
Direct Blue 182	—	—	—
Direct Brown 1	30045	Benzamine Brown 3GO	CI 596
Direct Brown 1A	30110	Benzamine Brown 3GO	CI 596
Direct Brown 2	22311	Diamine Brown M	CI 420
Direct Brown 3	—	—	—
Direct Brown 4	—	—	—

† Similar to but not identical.

† Similar to but not identical.

New CI Name	New CI No.	Old CI Name	Old CI No.
Direct Brown 5	30135	—	—
Direct Brown 6	30140	Congo Brown G	CI 598
Direct Brown 7	30035	—	—
Direct Brown 8	—	(Erie Brilliant Brown S)	—
Direct Brown 9	—	—	—
Direct Brown 10	—	—	—
Direct Brown 11	—	(†Erie Fast Brown R)	—
Direct Brown 12	—	—	—
Direct Brown 13	35710	—	—
Direct Brown 14	35715	—	—
Direct Brown 15	—	—	—
Direct Brown 16	—	—	—
Direct Brown 17	30100	—	—
Direct Brown 18	20220	—	—
Direct Brown 19	—	—	—
Direct Brown 20	30060	—	—
Direct Brown 21	30155	Congo Brown R	CI 601
Direct Brown 22	—	—	—
Direct Brown 23	—	—	—
Direct Brown 24	31700	—	—
Direct Brown 25	36030	Diamine Catechine G	Pr 69
Direct Brown 26	31730	Benzo Dark Brown Ex	Pr 23
Direct Brown 27	31725	Benzo Chrome Brown B	Pr 364
Direct Brown 28	—	—	—
Direct Brown 29	40505	Diphenyl Catechine G	CI 628
Direct Brown 30	17630	Alphanol Brown B	Pr 208
Direct Brown 31	35660	Trisulfon Brown B	CI 561
Direct Brown 32	34015	—	—
Direct Brown 33	35520	Diamine Catechine B	Pr 68
Direct Brown 34	40510	—	—
Direct Brown 35	—	(Erie Brown GB)	—
Direct Brown 36	—	(Erie Catechine 2BAC)	—
Direct Brown 37	20090	—	—
Direct Brown 38	—	—	—
Direct Brown 39	35060	—	—
Direct Brown 40	—	(Amanil Brown 3GS)	—
Direct Brown 41	—	—	—
Direct Brown 42	—	—	—
Direct Brown 43	35700	—	—
Direct Brown 44	35005	Benzo Brown G	CI 606
Direct Brown 44	35010	Benzo Brown G	CI 606
Direct Brown 45	—	—	—
Direct Brown 46	31785	—	—
Direct Brown 47	—	—	—
Direct Brown 48	—	(Amanil Fast Olive Brown RL)	—
Direct Brown 49	—	(Calcomine Catechine 3RS)	—
Direct Brown 50	20091	—	—
Direct Brown 51	31710	—	—
Direct Brown 52	31885	—	—
Direct Brown 53	13320	—	—
Direct Brown 54	31735	—	—
Direct Brown 55	—	—	—
Direct Brown 56	22040	—	—
Direct Brown 57	31705	Cupranil Brown B	CI 560
Direct Brown 58	22340	Diphenyl Brown BN	CI 422
Direct Brown 59	22345	Diamine Brown B	CI 423
Direct Brown 60	22325	—	—
Direct Brown 61	30055	—	—
Direct Brown 62	31720	—	—
Direct Brown 63	35040	—	—
Direct Brown 64	—	—	—
Direct Brown 65	—	—	—
Direct Brown 66	—	—	—
Direct Brown 67	26230	—	—
Direct Brown 68	30125	—	—
Direct Brown 69	30365	—	—
Direct Brown 70	35530	—	—
Direct Brown 71	—	(Diamine Catechine 6GA-CF)	—
Direct Brown 72	—	—	—
Direct Brown 73	35535	—	—
Direct Brown 74	36300	Diamine Catechine 3G	Pr 70
Direct Brown 75	30325	—	—
Direct Brown 76	—	—	—
Direct Brown 77	—	—	—
Direct Brown 78	40290	—	—
Direct Brown 79	30050	—	—
Direct Brown 80	20210	—	—
Direct Brown 81	—	—	—
Direct Brown 82	—	—	—
Direct Brown 83	—	—	—
Direct Brown 84	—	—	—
Direct Brown 85	—	—	—
Direct Brown 86	22030	—	—
Direct Brown 87	—	—	—
Direct Brown 88	—	—	—
Direct Brown 89	—	—	—
Direct Brown 90	—	—	—
Direct Brown 91	—	—	—
Direct Brown 92	—	—	—
Direct Brown 93	31860	—	—
Direct Brown 94	—	—	—
Direct Brown 95	30145	Chlorantine Fast Brown BRL	Pr 47
Direct Brown 96	—	—	—
Direct Brown 97	—	—	—
Direct Brown 98	—	—	—
Direct Brown 99	34020	—	—
Direct Brown 100	35800	Sirius Supra Brown 5G	Pr 574
Direct Brown 101	31740	Benzo Chrome Brown G	Pr 365
Direct Brown 102	—	—	—
Direct Brown 103	—	—	—
Direct Brown 104	—	—	—
Direct Brown 105	—	(Pontamine Fast Brown 3YL)	—
Direct Brown 106	36200	Benzo Fast Brown 3GL	Pr 28
Direct Brown 107	—	—	—
Direct Brown 108	—	—	—
Direct Brown 109	—	—	—
Direct Brown 110	—	(Nyalite Fast Brown 3RL)	—
Direct Brown 111	—	(Pontamine Diazo Brown R)	Pr 566
Direct Brown 112	29166	Chlorantine Fast Brown 8RLL	Pr 423
Direct Brown 113	—	—	—
Direct Brown 114	—	—	—
Direct Brown 115	—	—	—
Direct Brown 116	—	—	—
Direct Brown 117	—	—	—
Direct Brown 118	—	—	—
Direct Brown 119	—	—	—
Direct Brown 120	—	—	—
Direct Brown 121	—	—	—
Direct Brown 122	—	—	—
Direct Brown 123	—	(Diazine Brown CBS)	—
Direct Brown 124	—	(Dipyrazo Brown DB)	—
Direct Brown 125	—	Diazo Brown NR	Pr 82
Direct Brown 126	29085	—	—
Direct Brown 127	35210	—	—
Direct Brown 128	—	—	—
Direct Brown 129	—	—	—
Direct Brown 130	—	—	—
Direct Brown 131	—	—	—
Direct Brown 132	31505	Diazo Brown 3RB	Pr 83
Direct Brown 133	—	—	—
Direct Brown 134	—	—	—
Direct Brown 135	—	—	—
Direct Brown 136	—	—	—
Direct Brown 137	—	—	—
Direct Brown 138	31500	Diazo Brown 3R	Pr 250
Direct Brown 139	—	—	—
Direct Brown 140	—	—	—
Direct Brown 141	—	—	—
Direct Brown 142	—	—	—
Direct Brown 143	—	—	—
Direct Brown 144	—	—	—
Direct Brown 145	—	—	—
Direct Brown 146	25260	—	—
Direct Brown 147	23360	—	—
Direct Brown 148	25265	—	—
Direct Brown 149	36310	—	—
Direct Brown 150	36311	—	—
Direct Brown 151	31685	Para Brown V Ex	Pr 397
Direct Brown 152	25370	—	—
Direct Brown 153	31510	—	—
Direct Brown 154	30120	—	—
Direct Brown 155	—	—	—
Direct Brown 156	—	—	—
Direct Brown 157	—	—	—
Direct Brown 158	30070	—	—
Direct Brown 159	31755	—	—
Direct Brown 160	—	—	—
Direct Brown 161	—	—	—
Direct Brown 162	—	—	—
Direct Brown 163	—	Coprantine Black Brown S	Pr 595
Direct Brown 164	—	—	—
Direct Brown 165	22045	—	—
Direct Brown 166	31515	—	—
Direct Brown 167	22770	—	—
Direct Brown 168	22790	—	—
Direct Brown 169	—	—	—
Direct Brown 170	—	—	—
Direct Brown 171	30040	—	—
Direct Brown 172	—	—	—
Direct Brown 173	30165	—	—
Direct Brown 174	—	—	—
Direct Brown 175	30150	—	—
Direct Brown 176	—	—	—
Direct Brown 177	—	—	—
Direct Brown 178	—	—	—
Direct Brown 179	21575	—	—
Direct Brown 180	—	—	—
Direct Brown 181	—	—	—
Direct Brown 182	—	—	—
Direct Brown 183	—	—	—
Direct Brown 184	21500	—	—
Direct Brown 185	22855	—	—
Direct Brown 186	22775	—	—
Direct Brown 187	—	—	—
Direct Brown 188	—	—	—
Direct Brown 189	—	(Erieform Brown RRF)	—
Direct Brown 190	31750	(Formanil Brown R)	Pr 678

† Similar to but not identical.

New CI Name		New CI No.	Old CI Name	Old CI No.
Direct Green	1	30280	Chlorazol Dark Green	CI 583
Direct Green	2	—	—	—
Direct Green	3	32030	—	—
Direct Green	4	—	—	—
Direct Green	5	—	—	—
Direct Green	6	30295	Diamine Green B	CI 593
Direct Green	7	30330	—	—
Direct Green	8	30315	Diamine Green G	CI 594
Direct Green	9	30310	—	—
Direct Green	10	30285	—	—
Direct Green	11	27540	Brilliant Benzo Green B	Pr 368
Direct Green	12	30290	Chloramine Green B	CI 589
Direct Green	13	28470	—	—
Direct Green	14	—	(Erie Blue Green CW)	—
Direct Green	15	—	(Pontamine Green 2Y)	—
Direct Green	16	—	—	—
Direct Green	17	—	—	—
Direct Green	18	—	—	—
Direct Green	19	30305	—	—
Direct Green	20	30380	—	—
Direct Green	21	31790	(Formanil Green GB)	Pr 679
Direct Green	22	31775	—	—
Direct Green	23	31985	—	—
Direct Green	24	—	—	—
Direct Green	25	—	—	—
Direct Green	26	34045	Chlorantine Fast Green BLL	Pr 425
Direct Green	27	—	Solophenyl Fast Blue Green BL	Pr 470
Direct Green	28	14155	Chlorantine Fast Green 5GLL	Pr 616
Direct Green	29	—	—	—
Direct Green	30	—	—	—
Direct Green	31	—	—	—
Direct Green	32	—	—	—
Direct Green	33	34270	—	—
Direct Green	34	27970	—	—
Direct Green	35	—	—	—
Direct Green	36	31980	—	—
Direct Green	37	—	—	—
Direct Green	38	28280	Diazo Brilliant Green 3G	Pr 78
Direct Green	39	30220	Diazo Olive G	CI 595
Direct Green	40	—	—	—
Direct Green	41	—	(Pontamine Diazo Green 2GL)	—
Direct Green	42	28290	—	—
Direct Green	43	34280	—	—
Direct Green	44	—	—	—
Direct Green	45	—	(Dipyrazo Green FB)	—
Direct Green	46	—	(Dipyrazo Olive Green BLN)	—
Direct Green	47	—	(Pontamine Diazo Green BL)	—
Direct Green	48	—	—	—
Direct Green	49	28480	—	—
Direct Green	50	34295	—	—
Direct Green	51	34260	Diazo Fast Green GF	Pr 530
Direct Green	52	—	—	—
Direct Green	53	—	—	—
Direct Green	54	—	(Erieform Green B)	—
Direct Green	55	25315	—	—
Direct Green	56	—	—	—
Direct Green	57	24130	—	—
Direct Green	58	30225	—	—
Direct Green	59	34040	—	—
Direct Green	60	22315	—	—
Direct Orange	1	22375 22430	Pyrazol Orange	CI 653
Direct Orange	2	22380	—	—
Direct Orange	3	26280	—	—
Direct Orange	4	22920	—	—
Direct Orange	5	28650	—	—
Direct Orange	6	23365 23375	Toluylene Orange G	CI 478
Direct Orange	7	23380	—	—
Direct Orange	8	22130	Benzo Orange R	CI 415
Direct Orange	9	—	—	—
Direct Orange	10	23370	Toluylene Orange R	CI 446
Direct Orange	11	—	(Pluto Orange GRA-CF)	—
Direct Orange	11	—	(Pluto Orange GRL)	—
Direct Orange	12	—	—	—
Direct Orange	13	23605	—	—
Direct Orange	14	—	—	—
Direct Orange	15	40002 40003	Mikado Orange	CI 621
Direct Orange	16	—	—	—
Direct Orange	17	19160	—	—
Direct Orange	18	20215 6 20230	Diamine Orange B	CI 409
Direct Orange	19	—	—	—
Direct Orange	20	—	—	—
Direct Orange	21	—	—	—
Direct Orange	22	40004	—	—
Direct Orange	23	—	—	—
Direct Orange	24	20130	—	—
Direct Orange	25	22135	—	—
Direct Orange	26	29150	Benzo Fast Orange S	CI 326

† Similar to but not identical.

New CI Name		New CI No.	Old CI Name	Old CI No.
Direct Orange	27	40066	—	—
Direct Orange	28	40065	—	—
Direct Orange	29	29155	Benzo Fast Orange WS	CI 326
Direct Orange	30	23665	—	—
Direct Orange	31	23655	—	—
Direct Orange	32	20215	—	—
Direct Orange	33	22385	—	—
Direct Orange	34	40215 40220	Diamine Fast Orange EG	Pr 72
Direct Orange	35	40225	—	—
Direct Orange	36	40230	—	—
Direct Orange	37	40260 40265	Diamine Fast Orange ER	Pr 73
Direct Orange	38	—	Chlorantine Fast Orange T4RLL	Pr 426
Direct Orange	39	40215	Sirius Supra Orange GG	Pr 276
Direct Orange	40	40265	(Pontamine Fast Brown SKRL)	Pr 700
Direct Orange	41	40235	Sirius Supra Orange RRL	Pr 576
Direct Orange	42	—	Pyrazol Fast Orange 2GL	Pr 333
Direct Orange	43	—	—	—
Direct Orange	44	—	—	—
Direct Orange	45	—	—	—
Direct Orange	46	40215	—	—
Direct Orange	47	—	Chlorantine Fast Brown GL	Pr 48
Direct Orange	48	—	Durazol Orange R	Pr 536
Direct Orange	49	29050	—	—
Direct Orange	50	—	—	—
Direct Orange	51	—	—	—
Direct Orange	52	—	—	—
Direct Orange	53	—	—	—
Direct Orange	54	—	—	—
Direct Orange	55	—	(Pontamine Fast Brown 2RL)	—
Direct Orange	55	—	(†Solantine Brown R)	—
Direct Orange	56	—	—	—
Direct Orange	57	—	—	—
Direct Orange	58	—	—	—
Direct Orange	59	—	(Pontamine Fast Orange 2GL)	—
Direct Orange	60	40215	Sirius Supra Orange 5G	Pr 97
Direct Orange	61	40210	—	—
Direct Orange	62	—	Chloramine Fast Orange 2RN	Pr 490
Direct Orange	62	—	Chlorantine Fast Orange T5RLL	Pr 427
Direct Orange	63	25030	—	—
Direct Orange	64	—	(Pyrazoline Orange LR)	—
Direct Orange	65	—	—	—
Direct Orange	66	—	—	—
Direct Orange	67	—	(Solantine Orange R)	—
Direct Orange	68	—	—	—
Direct Orange	69	29055	—	—
Direct Orange	70	40245	—	—
Direct Orange	71	40205	(†Direct Fast Orange 2R)	Pr 666
Direct Orange	72	—	Solantine Orange 4G	Pr 578
Direct Orange	73	25200	Rosanthrene Orange R	Pr 173
Direct Orange	74	28255	Diazanil Orange 2R	Pr 435
Direct Orange	75	17840	Diazo Brilliant Orange GR Ex	Pr 376
Direct Orange	76	—	(Pontamine Diazo Orange)	Pr 567
Direct Orange	77	—	(Dipyrazo Orange 6G)	—
Direct Orange	78	—	(Dipyrazo Orange GR)	—
Direct Orange	79	—	(Pontamine Diazo Orange 3G)	Pr 568
Direct Orange	80	—	(Dipyrazo Orange BRS)	—
Direct Orange	81	—	(Pontamine Diazo Orange WD)	—
Direct Orange	82	—	—	—
Direct Orange	83	29090	Diazo Brown 6G	Pr 81
Direct Orange	84	19100	—	—
Direct Orange	85	25440	—	—
Direct Orange	86	—	(Amanil Developed Orange 3R)	—
Direct Orange	87	—	—	—
Direct Orange	88	—	(Pontamine Diazo Orange G)	Pr 626
Direct Orange	89	—	—	—
Direct Orange	90	28660	—	—
Direct Orange	91	—	(Diazine Orange DD)	—
Direct Orange	92	25085	—	—
Direct Orange	93	—	—	—
Direct Orange	94	—	—	—
Direct Orange	95	—	—	—
Direct Orange	96	25345	—	—
Direct Orange	97	—	—	—
Direct Orange	98	—	—	—
Direct Orange	99	—	—	—
Direct Orange	100	—	—	—
Direct Red	1	22310	Diamine Fast Red F	CI 419
Direct Red	2	23500	Benzopurpurine 4B	CI 448
Direct Red	3	15080	—	—
Direct Red	4	29165	Benzo Fast Scarlet GS	CI 326
Direct Red	5	—	(Erie Garnet RB)	—
Direct Red	5	—	(Diphenyl Garnet RB)	—

† Similar to but not identical.

New CI Name	New CI No.	Old CI Name	Old CI No.
Direct Red	6	27130	—	—
Direct Red	7	24100	Benzopurpurine 10B	CI 495
Direct Red	8	28105	—	—
Direct Red	9	—	—	—
Direct Red	10	22145	Congo Corinth G	CI 375
Direct Red	11	—	—	—
Direct Red	12	—	—	—
Direct Red	13	22155	Diamine Bordeaux B	Pr 67
Direct Red	14	29170	—	—
Direct Red	15	23510	—	—
Direct Red	16	27680	Benzo Bordeaux 6B	Pr 19
Direct Red	17	22150	Congo Rubine	CI 376
Direct Red	18	22280	—	—
Direct Red	19	—	—	—
Direct Red	20	15075	Diamine Rose BD	CI 128
Direct Red	21	23560	Benzopurpurine B	CI 450
Direct Red	22	23565	Deltapurpurine 5B	CI 451
Direct Red	23	29160	Benzo Fast Scarlet 4BS	CI 327
Direct Red	24	29185	Benzo Fast Scarlet 4BA	CI 326
Direct Red	25	—	—	—
Direct Red	26	29190	Benzo Fast Scarlet 8BS	CI 326
Direct Red	27	—	—	—
Direct Red	28	22120	Congo Red	CI 370
Direct Red	29	22305	—	—
Direct Red	30	—	(Pyrazoline Red 9B)	—
Direct Red	31	29100	Benzo Red 12B	Pr 30
Direct Red	32	28395	Erie Fast Rubine B	Pr 539
Direct Red	33	22306	—	—
Direct Red	34	23570	—	—
Direct Red	35	—	—	—
Direct Red	36	29220	—	—
Direct Red	37	22240	Diamine Scarlet B	CI 382
Direct Red	38	—	—	—
Direct Red	39	23630	Diamine Scarlet 3B	CI 382
Direct Red	40	—	(Pyrazoline Brown R)	—
Direct Red	41	—	—	—
Direct Red	42	22180	—	—
Direct Red	43	22205	Benzo Fast Red 9BL	CI 400
Direct Red	44	22500	Bordeaux COV	CI 385
Direct Red	45	14780	Rosophenine 10B	CI 225
Direct Red	46	23050	Toluylene Red	CI 436
Direct Red	47	14985	Erika 2GN	CI 126
Direct Red	48	14930	—	—
Direct Red	49	25375	—	—
Direct Red	50	31525	—	—
Direct Red	51	14990	Erika B	CI 130
Direct Red	52	22290	—	—
Direct Red	53	22405	Oxamine Brilliant Red B	Pr 393
Direct Red	54	29215	—	—
Direct Red	55	27780	—	—
Direct Red	56	23600	—	—
Direct Red	57	26720	—	—
Direct Red	58	—	—	—
Direct Red	59	22420	—	—
Direct Red	60	22200	—	—
Direct Red	61	23040	—	—
Direct Red	62	29175	—	—
Direct Red	63	—	—	—
Direct Red	64	17875	—	—
Direct Red	65	17870	—	—
Direct Red	66	—	—	—
Direct Red	67	23505	—	—
Direct Red	68	23515	—	—
Direct Red	69	14785	—	—
Direct Red	70	16081	—	—
Direct Red	71	—	—	—
Direct Red	72	29200	—	—
Direct Red	73	29180	(Formanil Scarlet G)	—
Direct Red	74	22170	—	—
Direct Red	75	25380	Benzo Fast Pink 2BL	CI 353
Direct Red	76	40270	Sirius Supra Scarlet GG	Pr 577
Direct Red	77	28110	Benzo Fast Bordeaux 6BL	Pr 217
Direct Red	78	—	—	—
Direct Red	79	29065	Chlorantine Fast Red 6BLL	Pr 428
Direct Red	80	35780	Chlorantine Fast Red 5BRL	Pr 246
Direct Red	81	28160	Benzo Fast Red 8BL	CI 278
Direct Red	82	—	—	—
Direct Red	83	29225	Chlorantine Fast Violet 2RL	Pr 491
Direct Red	84	35760	Sirius Supra Brown 3RL	Pr 575
Direct Red	85	28180	—	—
Direct Red	86	—	Diphenyl Fast Blue Red R	Pr 496
Direct Red	87	—	—	—
Direct Red	88	22360	—	—
Direct Red	89	—	—	—
Direct Red	90	28170	—	—
Direct Red	91	—	—	—
Direct Red	92	—	—	—
Direct Red	93	—	(Pyrazoline Brown 4RL)	—
Direct Red	94	—	(Pontamine Fast Brown 4RL)	—
Direct Red	95	—	—	—
Direct Red	96	—	—	—
Direct Red	97	—	(Nyalite Fast Red 3BL)	—
Direct Red	98	29230	—	—
Direct Red	99	—	Chlorantine Fast Bordeaux BLL	Pr 422
Direct Red	100	—	Chlorantine Fast Bordeaux 2B	Pr 421
Direct Red	101	25320	—	—
Direct Red	102	—	—	—
Direct Red	103	34025	—	—
Direct Red	104	—	—	—
Direct Red	105	—	—	—
Direct Red	106	—	—	—
Direct Red	107	—	—	—
Direct Red	108	28165	—	—
Direct Red	109	—	—	—
Direct Red	110	28370	—	—
Direct Red	111	40290	Sirius Supra Brown 3R	Pr 95
Direct Red	112	40290	—	—
Direct Red	113	17880	—	—
Direct Red	114	—	—	—
Direct Red	115	—	—	—
Direct Red	116	—	—	—
Direct Red	117	28230	—	—
Direct Red	118	—	Rosanthrene B	CI 324a
Direct Red	119	19590	—	—
Direct Red	120	25275	Diazo Rubine B	Pr 89
Direct Red	121	28250	Diazo Fast Bordeaux FBL	Pr 438
Direct Red	122	29210	Diazo Brilliant Scarlet 2BL Ex	Pr 79
Direct Red	123	17820	Diazo Brilliant Scarlet ROA	Pr 80
Direct Red	124	—	(Diazine Red BFW)	—
Direct Red	124	—	(Pontamine Diazine Red BFW)	—
Direct Red	125	—	—	—
Direct Red	126	17785	—	—
Direct Red	127	28215	Rosanthrene Fast Bordeaux 2BL	Pr 172
Direct Red	127A	28240	Rosanthrene Fast Bordeaux 2BL	Pr 172
Direct Red	128	—	(Diazine Scarlet GFW)	—
Direct Red	129	—	(Diazine Orange RFW)	—
Direct Red	130	28340	—	—
Direct Red	131	—	—	—
Direct Red	132	—	(Diazo Brilliant Scarlet GGA-CF)	—
Direct Red	133	—	Diazo Brilliant Scarlet BA Ex	Pr 493
Direct Red	134	—	—	—
Direct Red	135	—	(Amanil Developed Garnet RD)	—
Direct Red	136	—	(Amanil Developed Red 10 BL)	—
Direct Red	137	—	—	—
Direct Red	138	—	(Diazine Scarlet FW)	—
Direct Red	139	—	(Dipyrazo Scarlet RP)	Pr 532
Direct Red	140	—	—	—
Direct Red	141	25240	Diazo Brilliant Scarlet ROL Ex	Pr 494
Direct Red	142	19500	—	—
Direct Red	143	—	—	—
Direct Red	144	17830	—	—
Direct Red	145	17805	—	—
Direct Red	146	—	—	—
Direct Red	147	17800	—	—
Direct Red	148	25005	Rosanthrene Bordeaux B	Pr 404
Direct Red	149	29110	Diazo Bordeaux 7B	Pr 77
Direct Red	150	28260	—	—
Direct Red	151	—	—	—
Direct Red	152	28360	Diazo Fast Red 5BL	Pr 84
Direct Red	153	28210	Diazo Fast Red 7BL	Pr 85
Direct Red	154	28211	—	—
Direct Red	155	25210	Diazo Brilliant Scarlet 5BLN	Pr 377
Direct Red	156	25215	—	—
Direct Red	157	—	—	—
Direct Red	158	—	—	—
Direct Red	159	—	—	—
Direct Red	160	—	—	—
Direct Red	161	—	—	—
Direct Red	162	—	—	—
Direct Red	163	—	—	—
Direct Red	164	—	—	—
Direct Red	165	—	—	—
Direct Red	166	—	—	—
Direct Red	167	—	—	—
Direct Red	168	19575	—	—
Direct Red	169	25000	—	—
Direct Red	170	—	—	—
Direct Red	171	—	—	—
Direct Red	172	—	—	—
Direct Red	173	29290	—	—
Direct Red	174	—	—	—
Direct Red	175	—	—	—
Direct Red	176	—	—	—
Direct Red	177	—	—	—
Direct Red	178	30185	(Niagara Fast Copper Bordeaux BGL)	—
Direct Red	179	—	—	—
Direct Red	180	24565	—	—
Direct Red	181	—	—	—
Direct Red	182	—	—	—

New CI Name	New CI No.	Old CI Name	Old CI No.
Direct Red	183	—	—
Direct Red	184	—	—
Direct Red	185	21610	—
Direct Red	186	26540	—
Direct Red	187	40275	—
Direct Red	188	—	(Erieform Bordeaux B)
Direct Red	189	28400	(Formanil Rubine G) Pr 681
Direct Red	190	—	(Azoform Red B) —
Direct Red	191	17900	(Formanil Orange R) Pr 680
Direct Red	192	—	(Azoform Scarlet G) —
Direct Violet	1	22570	Diamine Violet N CI 394
Direct Violet	2	—	— —
Direct Violet	3	22445	Benzo Violet R CI 388
Direct Violet	4	22555	— —
Direct Violet	5	27660	— —
Direct Violet	6	25385	— —
Direct Violet	7	27855	Benzo Fast Heliotrope RRL Pr 366
Direct Violet	8	17500	— —
Direct Violet	9	27885	Brilliant Benzo Violet B Pr 35
Direct Violet	10	18100	— —
Direct Violet	11	27910	— —
Direct Violet	12	22550	Oxamine Violet CI 393
Direct Violet	13	24080	— —
Direct Violet	14	29105	Benzo Rhoduline Red 3B Pr 32
Direct Violet	15	—	— —
Direct Violet	16	27760	— —
Direct Violet	17	22465	— —
Direct Violet	18	—	— —
Direct Violet	19	—	— —
Direct Violet	20	—	— —
Direct Violet	21	23520	Congo Corinth B CI 461
Direct Violet	22	22480	Trisulfon Violet B CI 387
Direct Violet	23	—	— —
Direct Violet	24	—	— —
Direct Violet	25	22930	— —
Direct Violet	26	27860	— —
Direct Violet	27	22460	— —
Direct Violet	28	23685	— —
Direct Violet	29	—	(Amanil Brilliant Violet 4B) —
Direct Violet	30	—	(Amanil Brilliant Violet R) —
Direct Violet	31	27880	— —
Direct Violet	32	24105	— —
Direct Violet	33	—	(Calcomine Brilliant Violet 2R) —
Direct Violet	34	—	— —
Direct Violet	35	27915	— —
Direct Violet	36	22470	— —
Direct Violet	37	24370	— —
Direct Violet	38	22630	— —
Direct Violet	39	23680	— —
Direct Violet	40	27900	— —
Direct Violet	41	27850	— —
Direct Violet	42	22450	— —
Direct Violet	43	22440	— —
Direct Violet	44	—	— —
Direct Violet	45	22510	— —
Direct Violet	46	—	Chlorantine Fast Violet RLL Pr 430
Direct Violet	47	25410	Sirius Supra Red Violet RL Pr 277
Direct Violet	48	29125	Chlorantine Fast Violet 5BL Pr 429
Direct Violet	49	—	Sirius Light Violet BL Pr 609
Direct Violet	50	—	— —
Direct Violet	51	27905	Brilliant Benzo Fast Violet BL Pr 367
Direct Violet	51	27905	Diamine Fast Violet CI 325
Direct Violet	52	—	(Nyalite Fast Violet B) —
Direct Violet	53	—	— —
Direct Violet	54	51325	— —
Direct Violet	55	17515	— —
Direct Violet	56	17510	— —
Direct Violet	57	27865	— —
Direct Violet	58	—	— —
Direct Violet	59	—	— —
Direct Violet	60	—	(Calcodur Violet 4RL) —
Direct Violet	60	—	(Solantine Violet R) —
Direct Violet	61	—	— —
Direct Violet	62	25400	— —
Direct Violet	63	28190	— —
Direct Violet	64	28200	— —
Direct Violet	65	—	— —
Direct Violet	66	29120	— —
Direct Violet	67	—	Diazo Fast Violet BL Pr 531
Direct Violet	68	—	(Dipyrazo Violet R) —
Direct Violet	68	—	(Pontamine Diazo Violet RR) —
Direct Violet	69	—	— —
Direct Violet	70	—	— —
Direct Violet	71	—	— —
Direct Violet	72	28270	— —
Direct Violet	73	—	— —
Direct Violet	74	—	— —
Direct Violet	75	—	— —
Direct Violet	76	—	— —
Direct Violet	77	28725	— —
Direct Violet	78	28720	— —
Direct Violet	79	22780	— —
Direct Violet	80	25420	— —
Direct Violet	81	25355	— —
Direct Violet	82	—	— —
Direct Violet	83	25280	(Formanil Violet RR) Pr 683
Direct Violet	84	—	— —
Direct Violet	85	22520	(Formanil Violet BRL) Pr 682
Direct Violet	86	—	(Benzanol Fast Violet RR) —
Direct Violet	86	—	(Erieform Violet 2R) —
Direct Yellow	1	22250	Chrysamine G CI 410
Direct Yellow	2	23640	Chrysamine R CI 480
Direct Yellow	3	13925	Dianil Yellow 3G CI 647
Direct Yellow	4	24890	Brilliant Yellow CI 364
Direct Yellow	5	—	Direct Chinoline Pr 533
Direct Yellow	6	40001 40006	Mikado Yellow CI 622
Direct Yellow	7	49010	Thioflavine S CI 816
Direct Yellow	8	13920	Cloth Fast Yellow 5G Pr 492
Direct Yellow	8	13920	Dianil Yellow 5G Pr 249x
Direct Yellow	9	19540	Thiazol Yellow CI 813
Direct Yellow	10	14140	— —
Direct Yellow	11	40000	Sun Yellow CI 620
Direct Yellow	12	24895	Chrysophenine CI 365
Direct Yellow	13	25325	— —
Direct Yellow	14	18780	— —
Direct Yellow	15	25220	— —
Direct Yellow	16	—	(Direct Fast Yellow) —
Direct Yellow	17	18855	— —
Direct Yellow	18	13930	— —
Direct Yellow	19	40030	Diphenyl Chrysoine G CI 631
Direct Yellow	20	22410	Cresotine Yellow G CI 411
Direct Yellow	21	40045	— —
Direct Yellow	22	13925	Dianil Yellow 3G CI 647
Direct Yellow	23	—	(Pontamine Fast Yellow L2RX) —
Direct Yellow	24	22010	— —
Direct Yellow	25	21510	— —
Direct Yellow	26	25300	Benzo Fast Yellow 5GL CI 346
Direct Yellow	27	13950	Sirius Supra Yellow 5G Pr 99
Direct Yellow	28	19555	Chloramine Yellow CI 814
Direct Yellow	29	19556	Chloramine Yellow CI 814
Direct Yellow	30	19555 6	— —
Direct Yellow	31	—	— —
Direct Yellow	32	—	— —
Direct Yellow	33	29020	— —
Direct Yellow	34	29060	— —
Direct Yellow	35	—	— —
Direct Yellow	36	—	— —
Direct Yellow	37	—	— —
Direct Yellow	38	—	— —
Direct Yellow	39	—	Chlorantine Fast Yellow 2GLL Pr 526
Direct Yellow	40	—	— —
Direct Yellow	41	29005	Chlorantine Fast Yellow RL Pr 54
Direct Yellow	42	29010	— —
Direct Yellow	43	—	— —
Direct Yellow	44	29000	Chlorantine Fast Yellow 4GL Pr 53
Direct Yellow	45	—	— —
Direct Yellow	46	—	— —
Direct Yellow	47	—	— —
Direct Yellow	48	23660	— —
Direct Yellow	49	29035	Benzo Viscose Yellow GGL Pr 53
Direct Yellow	50	29025	Sirius Supra Yellow R Ex Pr 582
Direct Yellow	51	29030	— —
Direct Yellow	52	—	— —
Direct Yellow	53	—	— —
Direct Yellow	54	—	Chlorantine Fast Yellow 2RLL Pr 431
Direct Yellow	55	—	— —
Direct Yellow	56	—	— —
Direct Yellow	57	—	— —
Direct Yellow	58	—	— —
Direct Yellow	59	49000	Primuline CI 812
Direct Yellow	60	36350	— —
Direct Yellow	61	—	Diazo Fast Yellow 3G Pr 252
Direct Yellow	62	36900	Diazo Fast Yellow GG Pr 251
Direct Yellow	63	—	(Pontamine Diazo Yellow 2GL) —
Direct Yellow	64	—	Diazo Fast Yellow 3GLL Pr 495
Direct Yellow	65	—	— —
Direct Yellow	66	25225	— —
Direct Yellow	67	29080	— —
Direct Yellow	68	—	— —
Direct Yellow	69	25340	— —
Direct Yellow	70	—	— —
Direct Yellow	71	—	— —
Direct Yellow	72	24910	— —
Direct Yellow	73	24850	— —
Direct Yellow	74	25130	— —
Direct Yellow	75	—	— —
Direct Yellow	76	—	— —
Direct Yellow	77	—	— —
Direct Yellow	78	—	— —
Direct Yellow	79	—	(Pharmaform Golden Yellow R) —
Direct Yellow	80	—	(Nyaform Fast Yellow G) —
Direct Yellow	81	—	Diphenyl Fast Yellow RL Pr 439

DISPERSE DYES

New CI Name	New CI No.	Old CI Name	Old CI No.
Disperse Black	1	11365 Acetamine Diazo Black RB	Pr 630
Disperse Black	2	11255 Cibacete Diazo Black B	Pr 58
Disperse Black	3	11025 —	—
Disperse Black	4	11220 —	—
Disperse Black	5	— —	—
Disperse Black	6	37235 Dianisidine Blue	CI 499
Disperse Black	7	11035 Cellitazol NS	Pr 41
Disperse Black	8	— —	—
Disperse Black	9	— Cellitazol BNF	†Pr 523
Disperse Black	10	— Cellitazol 3GNF	Pr 523
Disperse Black	11	— —	—
Disperse Black	12	— —	—
Disperse Black	13	— —	—
Disperse Black	14	— —	—
Disperse Black	15	— —	—
Disperse Blue	1	64500 Cibacete Sapphire Blue G	Pr 62
Disperse Blue	2	— —	—
Disperse Blue	3	61505 Celliton Fast Blue FFR	Pr 228
Disperse Blue	4	— —	—
Disperse Blue	5	62035 —	—
Disperse Blue	6	62050 —	—
Disperse Blue	7	62500 Celliton Fast Blue Green B	Pr 229
Disperse Blue	8	— (Celanthrene Violet BGF)	—
Disperse Blue	9	61115 Celliton Fast Blue FR	Pr 227
Disperse Blue	10	— (Eastone Violet BGF)	—
Disperse Blue	11	— —	—
Disperse Blue	12	— —	—
Disperse Blue	13	— —	—
Disperse Blue	14	61500 —	—
Disperse Blue	15	11435 —	—
Disperse Blue	16	— —	—
Disperse Blue	17	— —	—
Disperse Blue	18	— —	—
Disperse Blue	19	61110 Amacel Violet Blue FSI	Pr 642
Disperse Blue	20	— —	—
Disperse Blue	21	— —	—
Disperse Blue	22	60715 —	—
Disperse Blue	23	61545 —	—
Disperse Blue	24	61515 —	—
Disperse Blue	25	— —	—
Disperse Blue	26	63305 —	—
Disperse Blue	27	— (Eastman Fast Blue GLF)	Pr 619
Disperse Blue	28	62065 —	—
Disperse Blue	29	— —	—
Disperse Blue	30	— —	—
Disperse Blue	31	64505 —	—
Disperse Blue	32	— (Amacel Blue GLF)	—
Disperse Blue	33	— (Eastone Blue BGF)	Pr 538
Disperse Blue	34	61510 —	—
Disperse Blue	35	— —	—
Disperse Blue	36	— —	—
Disperse Blue	37	— —	—
Disperse Blue	38	11430 —	—
Disperse Green	1	56060 —	—
Disperse Green	2	— —	—
Disperse Orange	1	11080 Amacel Orange I	Pr 637
Disperse Orange	2	— —	—
Disperse Orange	3	11005 Celliton Orange GR	Pr 43
Disperse Orange	4	— —	—
Disperse Orange	5	11100 Celliton Fast Brown 3R	Pr 230
Disperse Orange	6	— (Amacel Light Orange FSI)	—
Disperse Orange	7	11240 (Calcosyn Orange 3RC)	Pr 174
Disperse Orange	8	— —	—
Disperse Orange	9	— —	—
Disperse Orange	10	— —	—
Disperse Orange	11	60700 Amacel Orange II	Pr 638
Disperse Orange	12	— —	—
Disperse Orange	13	26080 Amacel Golden Orange I	Pr 635
Disperse Orange	14	— —	—
Disperse Orange	15	10350 Amacel Golden Orange III	Pr 636
Disperse Orange	16	— (Amacel Orange R)	—
Disperse Orange	16	— (Monocel Orange R)	—
Disperse Orange	17	— (Interchem Acetate Orange 4R)	Pr 551
Disperse Orange	18	— —	—
Disperse Orange	19	— —	—
Disperse Orange	20	— —	—
Disperse Orange	21	— —	—
Disperse Red	1	11110 Celliton Scarlet B	Pr 244
Disperse Red	2	11118 (Artisil Direct Scarlet GP)	—
Disperse Red	3	— —	—
Disperse Red	4	60755 Celliton Fast Pink RF	Pr 370
Disperse Red	5	11215 Celliton Fast Rubine 3B	Pr 239
Disperse Red	6	— —	—
Disperse Red	7	11150 Amacel Scarlet III	—
Disperse Red	8	— —	—
Disperse Red	9	60505 Amacel Red VI-X	Pr 639
Disperse Red	10	— —	—

New CI Name	New CI No.	Old CI Name	Old CI No.
Disperse Red	11	62015 Celliton Fast Pink FF3B	Pr 235
Disperse Red	12	— —	—
Disperse Red	13	11115 Celliton Fast Rubine B	Pr 238
Disperse Red	14	— —	—
Disperse Red	15	60710 Celliton Fast Pink B	Pr 234
Disperse Red	16	11225 —	—
Disperse Red	17	11210 Celliton Fast Red GG	Pr 236
Disperse Red	18	— —	—
Disperse Red	19	11130 —	—
Disperse Red	20	— (Eastone Red R)	Pr 621
Disperse Red	21	— (Eastone Rubine C)	—
Disperse Red	22	— —	—
Disperse Red	23	— —	—
Disperse Red	24	— —	—
Disperse Red	25	— Cibacete Red B	—
Disperse Red	26	— —	—
Disperse Red	27	— (Amacel Red 2B)	—
Disperse Red	28	— (Amacel Red Y)	—
Disperse Red	29	— —	—
Disperse Red	30	— (Eastone Red B)	—
Disperse Red	31	11250 Cibacete Scarlet G	Pr 63
Disperse Red	32	11190 Celliton Fast Brown 5R	Pr 231
Disperse Red	33	— —	—
Disperse Red	34	— —	—
Disperse Red	35	— (Eastone Fast Red GLF)	Pr 620
Disperse Red	36	— —	—
Disperse Red	37	— —	—
Disperse Red	38	— —	—
Disperse Red	39	— —	—
Disperse Red	40	— —	—
Disperse Red	41	11040 —	—
Disperse Red	42	— —	—
Disperse Red	43	— —	—
Disperse Violet	1	61100 Celliton Fast Red Violet RN	Pr 237
Disperse Violet	2	— —	—
Disperse Violet	3	— —	—
Disperse Violet	4	61105 Celliton Fast Violet 6B	Pr 241
Disperse Violet	5	— —	—
Disperse Violet	6	61140 Amacel Red FSI	Pr 640
Disperse Violet	7	11410 —	—
Disperse Violet	8	62030 Celliton Fast Violet B	Pr 240
Disperse Violet	9	— —	—
Disperse Violet	10	— —	—
Disperse Violet	11	— (Eastman Fast Violet 5RLF)	—
Disperse Violet	12	11120 —	—
Disperse Violet	13	11195 Amacel Violet 3R	Pr 641
Disperse Violet	14	— —	—
Disperse Violet	15	— —	—
Disperse Yellow	1	10345 Celliton Fast Yellow RR	Pr 243
Disperse Yellow	2	— Dispersol Fast Yellow 2G	Pr 534
Disperse Yellow	3	11855 Celliton Fast Yellow G	Pr 242
Disperse Yellow	4	12770 —	—
Disperse Yellow	5	12790 Celliton Yellow 5G	Pr 245
Disperse Yellow	6	— —	—
Disperse Yellow	7	26090 —	—
Disperse Yellow	8	— (Cibacete Yellow GN)	—
Disperse Yellow	9	10375 —	—
Disperse Yellow	10	12795 —	—
Disperse Yellow	11	56200 Celliton Brilliant Yellow FF	Pr 369
Disperse Yellow	12	— —	—
Disperse Yellow	13	58900 —	—
Disperse Yellow	14	10340 —	—
Disperse Yellow	15	— —	—
Disperse Yellow	16	12700 —	—
Disperse Yellow	17	— (Amacel Golden Yellow XI)	—
Disperse Yellow	18	— —	—
Disperse Yellow	19	— —	—
Disperse Yellow	20	— —	—
Disperse Yellow	21	— —	—
Disperse Yellow	22	— —	—
Disperse Yellow	23	— (Acetamine Fast Yellow 4RL)	Pr 583
Disperse Yellow	24	— —	—
Disperse Yellow	25	— (Eastone Yellow RN)	—
Disperse Yellow	26	— —	—
Disperse Yellow	27	— —	—
Disperse Yellow	28	— (Amacel Golden Yellow IX)	—
Disperse Yellow	29	— —	—
Disperse Yellow	30	— —	—
Disperse Yellow	31	48000 Celliton Fast Yellow 7G	Pr 420
Disperse Yellow	32	— (Acetamine Yellow N)	—
Disperse Yellow	33	— (Eastman Fast Yellow GLF)	Pr 537
Disperse Yellow	34	— (Amacel Yellow 4RLF)	—
Disperse Yellow	34	— (Eastman Fast Yellow 4RLF)	—
Disperse Yellow	35	— —	—
Disperse Yellow	36	— —	—
Disperse Yellow	37	— (Amacel Yellow CW)	—
Disperse Yellow	38	— (Amacel Yellow GL)	—
Disperse Yellow	39	— —	—

†Similar to but not identical.

FLUORESCENT BRIGHTENING AGENTS

New CI Name		New CI No.	Old CI Name	Old CI No.
Fluorescent Brightening Agent	1	40630	(Tinopal BVT)	Pr 698
Fluorescent Brightening Agent	2	†40630	(Phorwite GG)	†Pr 698
Fluorescent Brightening Agent	3	—	(Tinopal 4BMT)	—
Fluorescent Brightening Agent	4	—	(Calcofluor Yellow HEB)	—
Fluorescent Brightening Agent	5	36900	(Fluorescent Purple 2G)	—
Fluorescent Brightening Agent	6	—	—	—
Fluorescent Brightening Agent	7	—	—	—
Fluorescent Brightening Agent	8	—	—	—
Fluorescent Brightening Agent	9	—	—	—
Fluorescent Brightening Agent	10	—	(Calcofluor White 2RT)	—
Fluorescent Brightening Agent	11	—	—	—
Fluorescent Brightening Agent	12	—	—	—
Fluorescent Brightening Agent	13	—	—	—
Fluorescent Brightening Agent	14	—	—	—
Fluorescent Brightening Agent	15	—	—	—
Fluorescent Brightening Agent	16	—	—	—
Fluorescent Brightening Agent	17	—	—	—
Fluorescent Brightening Agent	18	—	(Tinopal SP)	—
Fluorescent Brightening Agent	19	—	—	—
Fluorescent Brightening Agent	20	—	—	—
Fluorescent Brightening Agent	21	—	—	—
Fluorescent Brightening Agent	22	—	—	—
Fluorescent Brightening Agent	23	—	—	—
Fluorescent Brightening Agent	24	—	—	—
Fluorescent Brightening Agent	25	—	(Blancophor HS-71, HS-76)	—
Fluorescent Brightening Agent	26	—	(Pontamine White CL)	—
Fluorescent Brightening Agent	27	36900	(Fluorescent Purple RB)	—
Fluorescent Brightening Agent	28	—	(Paper White BN, BP)	—
Fluorescent Brightening Agent	28	—	(Pontamine White BT, BTS)	—
Fluorescent Brightening Agent	29	—	Uvitex P	—
Fluorescent Brightening Agent	30	40600	Leucophor R	Pr 690
Fluorescent Brightening Agent	31	—	—	—
Fluorescent Brightening Agent	32	40620	Leucophor B	Pr 689
Fluorescent Brightening Agent	33	—	—	—
Fluorescent Brightening Agent	34	40605	(Pontamine White 2GT)	—
Fluorescent Brightening Agent	35	—	—	—
Fluorescent Brightening Agent	36	—	—	—
Fluorescent Brightening Agent	37	—	Uvitex RT	—
Fluorescent Brightening Agent	38	—	Uvitex TW	—
Fluorescent Brightening Agent	39	—	Uvitex U	—
Fluorescent Brightening Agent	40	—	—	—
Fluorescent Brightening Agent	41	49015	Uvitex RS	Pr 710
Fluorescent Brightening Agent	42	—	Uvitex GS	—
Fluorescent Brightening Agent	43	—	(Chemobleach W)	—
Fluorescent Brightening Agent	44	—	—	—
Fluorescent Brightening Agent	45	—	—	—
Fluorescent Brightening Agent	46	—	—	—
Fluorescent Brightening Agent	47	—	—	—
Fluorescent Brightening Agent	48	40640	—	—
Fluorescent Brightening Agent	49	—	(Leucophor BS)	—
Fluorescent Brightening Agent	50	—	(Leucophor BB)	—
Fluorescent Brightening Agent	51	—	—	—
Fluorescent Brightening Agent	52	—	Leucophor WS	—
Fluorescent Brightening Agent	53	—	—	—
Fluorescent Brightening Agent	54	—	—	—
Fluorescent Brightening Agent	55	—	(Tinopal ANA)	—
Fluorescent Brightening Agent	56	—	Uvitex WGS	—
Fluorescent Brightening Agent	57	—	Uvitex W	—
Fluorescent Brightening Agent	58	—	Uvitex NA	—
Fluorescent Brightening Agent	59	—	(Tinopal RBNA)	—
Fluorescent Brightening Agent	60	—	—	—
Fluorescent Brightening Agent	61	—	(Blancophor FFG)	—
Flourescent Brightening Agent	62	—	(Uvitex NL)	—
Fluorescent Brightening Agent	63	—	—	—
Fluorescent Brightening Agent	64	—	—	—
Fluorescent Brightening Agent	65	—	—	—
Fluorescent Brightening Agent	66	—	—	—
Fluorescent Brightening Agent	67	—	—	—
Fluorescent Brightening Agent	68	—	(Blancophor AW)	—
Fluorescent Brightening Agent	69	—	(Leucophor DC)	—
Fluorescent Brightening Agent	70	—	—	—
Fluorescent Brightening Agent	71	—	—	—
Fluorescent Brightening Agent	72	—	—	—
Fluorescent Brightening Agent	73	—	—	—
Fluorescent Brightening Agent	74	45550	(Fluorol 5GA)	Pr 542
Fluorescent Brightening Agent	75	—	(Fluorol 7GA)	—
Fluorescent Brightening Agent	76	—	(Fluorol OB)	—
Fluorescent Brightening Agent	77	—	—	—
Fluorescent Brightening Agent	78	—	—	—

†Similar to but not identical.

FOOD DYES

New CI Name		New CI No.	Old CI Name	Old CI No.
Food Black	1	28440	—	—
Food Blue	1	73015	Indigotine IA	CI 1180
Food Blue	2	42090	Erioglaucine	CI 671
Food Blue	3	42045	Xylene Blue VS	CI 672
Food Brown	1	—	—	—
Food Brown	2	—	—	—
Food Brown	3	20285	—	—
Food Green	1	42085	Guinea Green B	CI 666

New CI Name	New CI No.	Old CI Name	Old CI No.
Food Green	2 42095	Light Green SF Yellowish	CI 670
Food Green	3 42053	(FD&C Green No. 3)	Pr 672
Food Green	4 44090	Wool Green S	CI 737
Food Orange	1 15970	Crocein Orange G	CI 26
Food Orange	2 15980	—	—
Food Orange	3 11920	—	—
Food Orange	4 16230	Orange G	CI 27
Food Red	1 14700	(FD&C Red No. 4)	Pr 673
Food Red	2 14815	—	—
Food Red	3 14720	Azo Rubine	CI 179
Food Red	4 16045	—	—
Food Red	5 16150	Ponceau R	CI 79
Food Red	6 16155	Ponceau 3R	CI 80
Food Red	7 16255	Cochineal Red A	CI 185
Food Red	8 16290	—	—
Food Red	9 16185	Amaranth	CI 184
Food Red	10 18050	Amido Naphthol Red G	CI 31
Food Red	11 18055	Amido Naphthol Red 6B	CI 57
Food Red	12 17200	Fast Acid Fuchsine B	CI 30
Food Red	13 14780	Rosophenine 10B	CI 225
Food Red	14 45430	Erythrosine Bluish	CI 773
Food Red	15 45170	Rhodamine B	CI 749
Food Red	16 12150	Sudan R	CI 113
Food Violet	1 42650	—	CI 698
Food Violet	2 42640	Acid Violet 6B	CI 697
Food Yellow	1 10316	Naphthol Yellow S	CI 10
Food Yellow	2 13015	Fast Yellow	CI 16
Food Yellow	3 15985	(FD&C Yellow No. 6)	Pr 674
Food Yellow	4 19140	Tartrazine	CI 640
Food Yellow	5 18965	Xylene Light Yellow	CI 639
Food Yellow	6 13011	—	—
Food Yellow	7 13445	—	—
Food Yellow	8 14270	Tropaeolin O	CI 148
Food Yellow	9 14330	—	—
Food Yellow	10 11380	Oil Yellow AB	CI 22
Food Yellow	11 11390	Oil Yellow OB	CI 61
Food Yellow	12 12740	—	—
Food Yellow	13 47005	Quinoline Yellow	CI 801

INGRAIN DYES

New CI Name	New CI No.	Old CI Name	Old CI No.
Ingrain Blue	1 74240	—	—
Ingrain Blue	2 74160	—	—
Ingrain Green	1 —	—	—
Ingrain Green	2 —	—	—
Ingrain Yellow	1 —	—	—

MORDANT DYES

New CI Name	New CI No.	Old CI Name	Old CI No.
Mordant Black	1 15710	Eriochrome Black A	CI 204
Mordant Black	2 —	—	—
Mordant Black	3 14640	Eriochrome Blue Black B	CI 201
Mordant Black	4 —	—	—
Mordant Black	5 26695	Diamond Black F	CI 299
Mordant Black	6 —	—	—
Mordant Black	7 16505	Diamond Black P2B	Pr 375
Mordant Black	8 —	—	—
Mordant Black	9 16500	Diamond Black PV	CI 170
Mordant Black	10 21720	Acid Alizarin Black SE	CI 336
Mordant Black	11 14645	Eriochrome Black T	CI 203
Mordant Black	12 —	—	—
Mordant Black	13 63615	Alizarin Blue Black B	CI 1085
Mordant Black	14 —	—	—
Mordant Black	15 15690	—	—
Mordant Black	16 —	(Alizarol Black 3G)	—
Mordant Black	17 15705	Eriochrome Blue Black R	CI 202
Mordant Black	18 26955	—	—
Mordant Black	19 12200	—	—
Mordant Black	20 —	—	—
Mordant Black	21 —	—	—
Mordant Black	22 —	—	—
Mordant Black	23 —	—	—
Mordant Black	24 —	—	—
Mordant Black	25 21725	—	—
Mordant Black	26 —	Acid Alizarin Black RGW	Pr 514
Mordant Black	27 —	—	—
Mordant Black	28 —	—	—
Mordant Black	29 14865	—	—
Mordant Black	30 —	—	—
Mordant Black	31 —	—	—
Mordant Black	32 —	—	—
Mordant Black	33 —	(Hudson Chrome Gray BL)	—
Mordant Black	34 —	—	—
Mordant Black	35 —	—	—
Mordant Black	36 —	—	—
Mordant Black	37 57010	—	—
Mordant Black	38 18160	Monochrome Black Blue G	Pr 299
Mordant Black	39 —	—	—
Mordant Black	40 —	—	—
Mordant Black	41 —	—	—
Mordant Black	42 —	—	—
Mordant Black	43 —	—	—
Mordant Black	44 —	—	—
Mordant Black	45 —	—	—
Mordant Black	46 —	—	—
Mordant Black	47 —	—	—
Mordant Black	48 —	—	—
Mordant Black	49 —	—	—
Mordant Black	50 27270	—	—
Mordant Black	51 16510	—	—
Mordant Black	52 17520	—	—
Mordant Black	53 —	—	—
Mordant Black	54 —	—	—
Mordant Black	55 —	—	—
Mordant Black	56 16710	—	—
Mordant Black	57 63620	—	—
Mordant Black	58 —	—	—
Mordant Black	59 —	—	—
Mordant Black	60 —	—	—
Mordant Black	61 —	—	—
Mordant Black	62 26750	—	—
Mordant Black	63 —	—	—
Mordant Black	64 —	—	—
Mordant Black	65 18170	—	—
Mordant Black	66 17525	—	—
Mordant Black	67 —	—	—
Mordant Black	68 26751	Diamond Black FB	CI 299
Mordant Black	69 —	—	—
Mordant Black	70 —	—	—
Mordant Black	71 —	—	—
Mordant Black	72 —	—	—
Mordant Black	73 —	—	—
Mordant Black	74 27740	—	—
Mordant Black	75 —	—	—
Mordant Black	76 —	—	—
Mordant Black	77 —	—	—
Mordant Blue	1 43830	Eriochrome Azurol B	CI 720
Mordant Blue	2 —	—	—
Mordant Blue	3 43820	Eriochrome Cyanine R	CI 722
Mordant Blue	4 15695	—	—
Mordant Blue	5 —	Eriochrome Blue Black R	CI 202
Mordant Blue	6 21590	—	—
Mordant Blue	7 17940	Metomega Chrome Cyanine BLL	Pr 603
Mordant Blue	8 58805	—	—
Mordant Blue	9 14855	Acid Chrome Blue 2R	Pr 7
Mordant Blue	10 51030	Gallocyanine	CI 883
Mordant Blue	11 —	—	—
Mordant Blue	12 —	Metomega Chrome Blue 2RL	Pr 455
Mordant Blue	13 16680	Fast Mordant Blue B	Pr 93
Mordant Blue	14 51050	—	—
Mordant Blue	15 —	—	—
Mordant Blue	16 —	—	—
Mordant Blue	17 —	—	—
Mordant Blue	18 18090	—	—
Mordant Blue	19 —	Anthracene Navy Blue BR	Pr 411
Mordant Blue	20 —	—	—
Mordant Blue	21 —	—	—
Mordant Blue	22 —	—	—
Mordant Blue	23 58610	Anthracene Blue SWX	CI 1063
Mordant Blue	24 60880	—	—
Mordant Blue	25 —	—	—

New CI Name	New CI No.	Old CI Name	Old CI No.
Mordant Blue	26	— Metomega Chrome Blue 2BL Conc	Pr 454
Mordant Blue	27	67415 —	—
Mordant Blue	28	44535 —	—
Mordant Blue	29	43825 —	—
Mordant Blue	30	— —	—
Mordant Blue	31	16675 —	—
Mordant Blue	32	58605 Anthracene Blue WR	CI 1062
Mordant Blue	33	— —	—
Mordant Blue	34	— —	—
Mordant Blue	35	51080 —	—
Mordant Blue	36	51055 —	—
Mordant Blue	37	— —	—
Mordant Blue	38	— —	—
Mordant Blue	39	— —	—
Mordant Blue	40	— —	—
Mordant Blue	41	— —	—
Mordant Blue	42	44100 —	—
Mordant Blue	43	— —	—
Mordant Blue	44	17250 —	—
Mordant Blue	45	51045 —	—
Mordant Blue	46	51155 —	—
Mordant Blue	47	43855 —	—
Mordant Blue	48	62120 —	—
Mordant Blue	49	— —	—
Mordant Blue	50	58550 —	—
Mordant Blue	51	52055 Brilliant Alizarin Blue G	CI 931
Mordant Blue	52	42015 —	—
Mordant Blue	53	— —	—
Mordant Blue	54	16685 Acid Chrome Blue 3G	Pr 408
Mordant Blue	55	43835 —	—
Mordant Blue	56	51120 Delphine Blue B	CI 878
Mordant Blue	57	— —	—
Mordant Blue	58	— —	—
Mordant Blue	59	51125 —	—
Mordant Blue	60	— —	—
Mordant Blue	61	— —	—
Mordant Blue	62	— —	—
Mordant Blue	63	— —	—
Mordant Blue	64	— —	—
Mordant Blue	65	— —	—
Mordant Blue	66	— —	—
Mordant Blue	67	— —	—
Mordant Blue	68	— —	—
Mordant Blue	69	— —	—
Mordant Blue	70	— —	—
Mordant Blue	71	— —	—
Mordant Blue	72	16680 —	—
Mordant Brown	1	20110 Anthracene Chromate Brown EB	Pr 14
Mordant Brown	2	— —	—
Mordant Brown	3	— —	—
Mordant Brown	4	11335 Metachrome Brown B	CI 101
Mordant Brown	5	— —	—
Mordant Brown	6	11875 —	—
Mordant Brown	7	57030 —	—
Mordant Brown	8	— —	—
Mordant Brown	9	— —	—
Mordant Brown	10	— —	—
Mordant Brown	11	13295 —	—
Mordant Brown	12	11290 —	—
Mordant Brown	13	13225 Acid Alizarin Brown B	CI 167
Mordant Brown	14	13310 —	—
Mordant Brown	15	14870 Acid Anthracene Brown KE	Pr 203
Mordant Brown	16	— (Chromate Brown R)	—
Mordant Brown	17	— Acid Anthracene Brown B	Pr 2
Mordant Brown	18	20150 Anthracene Acid Brown G	CI 238
Mordant Brown	19	14250 Eriochrome Brown DKL	Pr 253
Mordant Brown	20	†14250 (Acid Anthracene Brown LE-CF)	Pr 253
Mordant Brown	21	19600 Acid Anthracene Brown TBL	Pr 584
Mordant Brown	22	14235 Acid Anthracene Brown WSG	Pr 205
Mordant Brown	23	— —	—
Mordant Brown	24	11880 —	—
Mordant Brown	25	13305 —	—
Mordant Brown	26	44525 —	—
Mordant Brown	27	— —	—
Mordant Brown	28	— —	—
Mordant Brown	29	— —	—
Mordant Brown	30	13230 —	—
Mordant Brown	31	— —	—
Mordant Brown	32	— —	—
Mordant Brown	33	13250 Palatine Chrome Brown 2G	CI 98
Mordant Brown	34	— —	—
Mordant Brown	35	14765 Acid Anthracene Brown 3B	Pr 3
Mordant Brown	36	35750 —	—
Mordant Brown	37	— —	—
Mordant Brown	38	— —	—
Mordant Brown	39	— —	—
Mordant Brown	40	17590 Acid Anthracene Brown PG	Pr 4
Mordant Brown	41	14340 —	—
Mordant Brown	42	58200 Anthracene Brown	CI 1035
Mordant Brown	43	— (Alizarine Brown 5R Ex)	†CI 1035
Mordant Brown	44	58020 —	—

† Similar to but not identical.

New CI Name	New CI No.	Old CI Name	Old CI No.
Mordant Brown	45	— —	—
Mordant Brown	46	— —	—
Mordant Brown	47	— —	—
Mordant Brown	48	11300 —	—
Mordant Brown	49	13265 —	—
Mordant Brown	50	— Metomega Chrome Brown 3GL	Pr 456
Mordant Brown	51	25630 —	—
Mordant Brown	52	— —	—
Mordant Brown	53	— —	—
Mordant Brown	54	11965 —	—
Mordant Brown	55	— —	—
Mordant Brown	56	— —	—
Mordant Brown	57	— —	—
Mordant Brown	58	— —	—
Mordant Brown	59	— —	—
Mordant Brown	60	16065 —	—
Mordant Brown	61	16070 (Alizarol Brown B)	Pr 634
Mordant Brown	62	— —	—
Mordant Brown	63	— Metomega Chrome Brown RLL	Pr 298
Mordant Brown	64	— —	—
Mordant Brown	65	28670 —	—
Mordant Brown	66	11890 —	—
Mordant Brown	67	— —	—
Mordant Brown	68	— —	—
Mordant Brown	69	20120 —	—
Mordant Brown	70	†13265 Acid Anthracene Brown R	CI 105
Mordant Brown	71	— (Anthracene Chrome Brown RL)	—
Mordant Brown	72	— —	—
Mordant Brown	73	— —	—
Mordant Brown	74	— —	—
Mordant Brown	75	— —	—
Mordant Brown	76	— —	—
Mordant Brown	77	— —	—
Mordant Brown	78	— (Chromate Brilliant Brown RL)	—
Mordant Brown	79	— —	—
Mordant Brown	80	— —	—
Mordant Brown	81	— —	—
Mordant Brown	82	— —	—
Mordant Brown	83	— —	—
Mordant Brown	84	— (Chromaven Brown GR)	—
Mordant Brown	85	— —	—
Mordant Brown	86	— —	—
Mordant Brown	87	— —	—
Mordant Brown	88	— —	—
Mordant Brown	89	— —	—
Mordant Green	1	— —	—
Mordant Green	2	11835 —	—
Mordant Green	3	— —	—
Mordant Green	4	10005 —	—
Mordant Green	5	— —	—
Mordant Green	6	— —	—
Mordant Green	7	— —	—
Mordant Green	8	— —	—
Mordant Green	9	19515 Chrome Fast Green G	Pr 527
Mordant Green	10	— —	—
Mordant Green	11	20440 —	—
Mordant Green	12	27520 Diamond Green SS	CI 302
Mordant Green	13	42005 —	—
Mordant Green	14	— —	—
Mordant Green	15	26925 Eriochrome Verdone A	CI 292
Mordant Green	16	— (Chromaven Green G)	—
Mordant Green	17	17225 Palatine Chrome Green G	CI 99
Mordant Green	18	— —	—
Mordant Green	19	67440 —	—
Mordant Green	20	— —	—
Mordant Green	21	43845 —	—
Mordant Green	22	45510 Coerulein L	CI 783
Mordant Green	23	42010 —	—
Mordant Green	24	11395 —	—
Mordant Green	25	— —	—
Mordant Green	26	18180 Eriochrome Olive BL	Pr 254
Mordant Green	27	— (Superchrome Olive GL)	—
Mordant Green	28	17220 —	—
Mordant Green	29	— —	—
Mordant Green	30	17130 —	—
Mordant Green	31	44530 —	—
Mordant Green	32	17125 —	—
Mordant Green	33	— —	—
Mordant Green	34	17650 —	—
Mordant Green	35	— —	—
Mordant Green	36	17235 —	—
Mordant Green	37	— —	—
Mordant Green	38	— —	—
Mordant Green	39	— (Serichrome Green B)	—
Mordant Green	40	— —	—
Mordant Green	41	— Monochrome Olive FBL	Pr 459
Mordant Green	42	— (Chrome Green CB)	—
Mordant Green	43	— —	—
Mordant Green	44	— —	—
Mordant Green	45	— —	—

† Similar to but not identical.

New CI Name		New CI No.	Old CI Name	Old CI No.
Mordant Green	46	—	—	—
Mordant Green	47	—	—	—
Mordant Green	48	—	—	—
Mordant Green	49	—	—	—
Mordant Green	50	—	—	—
Mordant Green	51	—	—	—
Mordant Orange	1	14030	Alizarin Yellow R	CI 40
Mordant Orange	2	14040	—	—
Mordant Orange	3	18840	—	—
Mordant Orange	4	18940	Chrome Fast Orange 3RL	Pr 247
Mordant Orange	5	—	—	—
Mordant Orange	6	26520	Milling Orange	CI 274
Mordant Orange	7	—	—	—
Mordant Orange	8	—	Metomega Chrome Orange ML	Pr 457
Mordant Orange	9	—	—	—
Mordant Orange	10	26560	Milling Orange	CI 274
Mordant Orange	11	—	—	—
Mordant Orange	12	—	—	—
Mordant Orange	13	—	—	—
Mordant Orange	14	58015	—	—
Mordant Orange	15	14035	—	—
Mordant Orange	16	—	—	—
Mordant Orange	17	—	—	—
Mordant Orange	18	—	—	—
Mordant Orange	19	16220	—	—
Mordant Orange	20	—	—	—
Mordant Orange	21	—	—	—
Mordant Orange	22	21570	—	—
Mordant Orange	23	—	—	—
Mordant Orange	24	—	—	—
Mordant Orange	25	—	—	—
Mordant Orange	26	19325	—	—
Mordant Orange	27	—	—	—
Mordant Orange	28	—	—	—
Mordant Orange	29	18744	—	—
Mordant Orange	30	—	(Alizarol Orange 3R)	—
Mordant Orange	31	—	—	—
Mordant Orange	32	—	—	—
Mordant Orange	33	—	—	—
Mordant Orange	34	—	(Hudson Chrome Orange SL)	—
Mordant Orange	35	18845	—	—
Mordant Orange	36	—	—	—
Mordant Orange	37	18730	—	—
Mordant Orange	38	—	—	—
Mordant Orange	39	—	—	—
Mordant Orange	40	—	—	—
Mordant Orange	41	—	—	—
Mordant Red	1	—	—	—
Mordant Red	2	58255 58260	—	—
Mordant Red	2	58260	—	—
Mordant Red	3	58005	Alizarin Red S	CI 1034
Mordant Red	4	58240	Alizarin GI	CI 1039
Mordant Red	5	14290	Acid Alizarin Garnet R	CI 168
Mordant Red	6	—	(Acid Alizarine Bordeaux BLT)	—
Mordant Red	7	18760	Eriochrome Red B	CI 652
Mordant Red	8	23095	Anthracene Red	CI 431
Mordant Red	9	16105	Acid Alizarin Red B	CI 216
Mordant Red	10	—	—	—
Mordant Red	11	58000	Alizarin VI	CI 1027
Mordant Red	12	—	—	—
Mordant Red	13	—	—	—
Mordant Red	14	—	—	—
Mordant Red	15	45305	—	—
Mordant Red	16	—	—	—
Mordant Red	17	18750	—	—
Mordant Red	18	—	—	—
Mordant Red	19	18735	Metachrome Red G	Pr 135
Mordant Red	20	—	(Erio Chrome Bordeaux B)	CI 168
Mordant Red	21	17995	—	—
Mordant Red	22	—	—	—
Mordant Red	23	—	—	—
Mordant Red	24	—	—	—
Mordant Red	25	—	—	—
Mordant Red	26	17075	—	—
Mordant Red	27	45180	—	—
Mordant Red	28	11170	—	—
Mordant Red	29	43505	—	—
Mordant Red	30	19360	—	—
Mordant Red	31	—	—	—
Mordant Red	32	14210	—	—
Mordant Red	33	—	—	—
Mordant Red	34	16060	—	—
Mordant Red	35	—	—	—
Mordant Red	36	—	Metomega Chrome Red GM	Pr 458
Mordant Red	37	—	—	—
Mordant Red	38	—	—	—
Mordant Red	39	18885	—	—
Mordant Red	40	—	—	—
Mordant Red	41	18920	—	—
Mordant Red	42	—	—	—
Mordant Red	43	—	—	—
Mordant Red	44	16200	—	—
Mordant Red	45	58230	—	—
Mordant Red	46	—	—	—
Mordant Red	47	—	—	—
Mordant Red	48	—	—	—
Mordant Red	49	18770	—	—
Mordant Red	50	—	—	—
Mordant Red	51	18060	—	—
Mordant Red	52	—	—	—
Mordant Red	53	—	—	—
Mordant Red	54	—	—	—
Mordant Red	55	—	—	—
Mordant Red	56	—	—	—
Mordant Red	57	—	—	—
Mordant Red	58	—	—	—
Mordant Red	59	11940	—	—
Mordant Red	60	15975	—	—
Mordant Red	61	—	—	—
Mordant Red	62	—	—	—
Mordant Red	63	—	—	—
Mordant Red	64	—	—	—
Mordant Red	65	28420	—	—
Mordant Red	66	28410	—	—
Mordant Red	67	14300	—	—
Mordant Red	68	—	—	—
Mordant Red	69	—	—	—
Mordant Red	70	—	—	—
Mordant Red	71	19240	—	—
Mordant Red	72	—	—	—
Mordant Red	73	18765	—	—
Mordant Red	74	16315	—	—
Mordant Red	75	—	—	—
Mordant Red	76	—	—	—
Mordant Red	77	45300	—	—
Mordant Red	78	—	—	—
Mordant Red	79	—	—	—
Mordant Red	80	26565	—	—
Mordant Red	81	—	—	—
Mordant Red	82	—	—	—
Mordant Red	83	—	—	—
Mordant Red	84	—	—	—
Mordant Violet	1	43565	Naphtochrome Violet R	Pr 461
Mordant Violet	2	14670	—	—
Mordant Violet	3	—	—	—
Mordant Violet	4	14760	—	—
Mordant Violet	5	15670	Acid Alizarin Violet N	CI 169
Mordant Violet	6	43510	—	—
Mordant Violet	7	—	—	—
Mordant Violet	8	43515	—	—
Mordant Violet	9	—	—	—
Mordant Violet	10	43555	—	—
Mordant Violet	11	43550	Chromoxane Brilliant Violet SB	Pr 484
Mordant Violet	12	28490	—	—
Mordant Violet	13	—	—	—
Mordant Violet	14	—	—	—
Mordant Violet	15	43560	—	—
Mordant Violet	16	43865	—	—
Mordant Violet	17	43866	—	—
Mordant Violet	18	44015	—	—
Mordant Violet	19	43551	—	—
Mordant Violet	20	—	Monochrome Violet FB	Pr 301
Mordant Violet	21	—	—	—
Mordant Violet	22	—	—	—
Mordant Violet	23	43540	—	—
Mordant Violet	24	—	—	—
Mordant Violet	25	45445	Gallein	CI 781
Mordant Violet	26	58500	—	—
Mordant Violet	27	43860	—	—
Mordant Violet	28	43570	—	—
Mordant Violet	29	—	—	—
Mordant Violet	30	15700	—	—
Mordant Violet	31	—	—	—
Mordant Violet	32	—	—	—
Mordant Violet	33	43870	—	—
Mordant Violet	34	—	—	—
Mordant Violet	35	51025	—	—
Mordant Violet	36	43552	—	—
Mordant Violet	37	—	—	—
Mordant Violet	38	—	—	—
Mordant Violet	39	43810	—	—
Mordant Violet	40	14745	—	—
Mordant Violet	41	14220	—	—
Mordant Violet	42	—	—	—
Mordant Violet	43	—	—	—
Mordant Violet	44	14750	—	—
Mordant Violet	45	—	—	—
Mordant Violet	46	14740	—	—
Mordant Violet	47	—	—	—
Mordant Violet	48	—	(Palizarine Violet 2R)	—
Mordant Violet	49	—	—	—
Mordant Violet	50	51055	—	—
Mordant Violet	51	—	—	—
Mordant Violet	52	—	—	—
Mordant Violet	53	—	—	—
Mordant Violet	54	51040	—	—

New CI Name		New CI No.	Old CI Name	Old CI No.
Mordant Violet	55	51090	—	—
Mordant Violet	56	—	—	—
Mordant Violet	57	—	—	—
Mordant Violet	58	51165	—	—
Mordant Violet	59	—	—	—
Mordant Violet	60	—	—	—
Mordant Violet	61	—	—	—
Mordant Violet	62	—	—	—
Mordant Yellow	1	14025	Alizarin Yellow 2G	CI 36
Mordant Yellow	2	—	—	—
Mordant Yellow	3	14095	Mordant Yellow O	CI 195
Mordant Yellow	4	—	—	—
Mordant Yellow	5	14130	Eriochrome Flavine A	CI 219
Mordant Yellow	6	—	—	—
Mordant Yellow	7	—	—	—
Mordant Yellow	8	18821	Acid Alizarin Flavine R	Pr 1
Mordant Yellow	9	14190	—	—
Mordant Yellow	10	14010	Chrome Yellow G	Pr 56
Mordant Yellow	11	—	—	—
Mordant Yellow	12	14045	—	—
Mordant Yellow	13	—	(Apochrome Yellow Y)	—
Mordant Yellow	14	14055	Azo Alizarin Yellow GP	CI 52
Mordant Yellow	15	—	—	—
Mordant Yellow	16	25100	Anthracene Yellow C	CI 343
Mordant Yellow	17	—	—	—
Mordant Yellow	18	13990	—	—
Mordant Yellow	19	—	—	—
Mordant Yellow	20	14110	Crumpsall Yellow	CI 197
Mordant Yellow	21	23130	—	—
Mordant Yellow	22	—	—	—
Mordant Yellow	23	—	—	—
Mordant Yellow	24	14020	—	—
Mordant Yellow	25	—	—	—
Mordant Yellow	26	22880	Chromocitronine R	CI 441
Mordant Yellow	27	14180	—	—
Mordant Yellow	28	14090	—	—
Mordant Yellow	29	—	(Chrome Yellow SSN Ex)	†CI 195
Mordant Yellow	30	18710	Omega Chrome Yellow ME	Pr 317
Mordant Yellow	31	†18710	—	—
Mordant Yellow	32	14100	—	—
Mordant Yellow	33	56210	—	—
Mordant Yellow	34	—	—	—
Mordant Yellow	35	19035	—	—
Mordant Yellow	36	14135	Diamond Flavine G	CI 110
Mordant Yellow	37	—	—	—
Mordant Yellow	38	14080	Alizarin Yellow 5G	CI 122
Mordant Yellow	39	—	—	—
Mordant Yellow	40	—	—	—
Mordant Yellow	41	—	—	—
Mordant Yellow	42	—	—	—
Mordant Yellow	43	—	—	—
Mordant Yellow	44	14115	—	—
Mordant Yellow	45	19070	—	—
Mordant Yellow	46	—	—	—
Mordant Yellow	47	14090	—	—
Mordant Yellow	48	23090	—	—
Mordant Yellow	49	—	—	—
Mordant Yellow	50	—	—	—
Mordant Yellow	51	14075	—	—
Mordant Yellow	52	—	—	—
Mordant Yellow	53	—	—	—
Mordant Yellow	54	—	—	—
Mordant Yellow	55	—	—	—
Mordant Yellow	56	—	—	—
Mordant Yellow	57	13995	—	—
Mordant Yellow	58	—	—	—
Mordant Yellow	59	—	—	—

† Similar to but not identical.

NATURAL DYES & PIGMENTS

New CI Name		New CI No.	Old CI Name	Old CI No.
Natural Black	1	75290	Logwood	CI 1246
Natural Black	2	75290	—	—
Natural Black	3	75291	—	—
Natural Black	4	75291	Steam Black	CI 1253
Natural Black	5	—	—	—
Natural Black	6	—	—	—
Natural Blue	1	75780	—	—
		75790		
Natural Blue	2	75781	—	—
Natural Blue	3	75190	—	—
Natural Brown	1	75620	Young Fustic	CI 1231
Natural Brown	2	—	—	—
Natural Brown	3	75250	Cutch	CI 1249
		75260		
Natural Brown	4	—	—	—
Natural Brown	5	75130	—	—
		75750		
Natural Brown	6	—	—	—
Natural Brown	7	75500	—	—
Natural Brown	8	—	—	—
Natural Brown	9	—	—	—
Natural Brown	10	—	—	—
Natural Brown	11	—	—	—
Natural Green	1	—	—	—
Natural Green	2	75440	—	—
		75650		
		75695		
Natural Green	3	75810	—	—
Natural Green	4	—	—	—
Natural Orange	1	—	—	—
Natural Orange	2	75310	—	—
Natural Orange	3	75110	—	—
Natural Orange	4	75120	—	—
Natural Orange	5	75180	—	—
Natural Orange	6	75480	—	—
Natural Red	1	75100	—	—
		75670		
Natural Red	2	—	—	—
Natural Red	3	75460	—	—
Natural Red	4	75470	Carmine	CI 1239
Natural Red	5	—	—	—
Natural Red	6	75330	—	—
Natural Red	7	—	—	—
Natural Red	8	75330	—	—
		75340		
		75350		
		75370		
		75410		
		75420		
Natural Red	9	75330	—	—
		75420		
Natural Red	10	75330	—	—
Natural Red	11	75330	—	—
Natural Red	12	75330	—	—
Natural Red	13	—	—	—
Natural Red	14	75420	—	—
Natural Red	15	—	—	—
Natural Red	16	75340	—	—
		75350		
		75370		
		75410		
Natural Red	17	—	—	—
Natural Red	18	75380	—	—
		75390		
Natural Red	19	75360	—	—
		75430		
Natural Red	20	75520	—	—
		75530		
Natural Red	21	—	—	—
Natural Red	22	75510	—	—
		75540		
		75550		
		75560		
Natural Red	23	75510	—	—
Natural Red	24	75280	Hypernic	CI 1243
Natural Red	25	75450	—	—
Natural Red	26	75140	—	—
Natural Red	27	—	—	—
Natural Red	28	—	—	—
Natural Red	29	—	—	—
Natural Red	30	—	—	—
Natural Red	31	75200	—	—
		75210		
Natural Red	32	—	—	—
Natural White	1	75170	—	—
Natural Yellow	1	75580	—	—
		75590		
Natural Yellow	2	75580	—	—
Natural Yellow	3	75300	—	—
Natural Yellow	4	—	—	—
Natural Yellow	5	—	—	—
Natural Yellow	6	75100	—	—
Natural Yellow	7	—	—	—
Natural Yellow	8	75660	—	—
Natural Yellow	9	—	—	—
Natural Yellow	10	75570	Quercitron	CI 1233
		75640		
		75670		
		75680		
		75710		
		75720		
		75730		
		75750		

New CI Name	New CI No.	Old CI Name	Old CI No.
Natural Yellow	11 75240	Fustic	CI 1232
	75660		
Natural Yellow	12 75630	—	—
Natural Yellow	13 75640	—	—
	75430		
	75650		
	75670		
	75690		
	75700		
	75695		
Natural Yellow	14 75440	—	—
Natural Yellow	15 —	—	—
Natural Yellow	16 75490	—	—
Natural Yellow	17 —	—	—
Natural Yellow	18 75160	—	—
Natural Yellow	19 75100	—	—
Natural Yellow	20 —	—	—
Natural Yellow	21 —	—	—
Natural Yellow	22 —	—	—
Natural Yellow	23 75400	—	—
Natural Yellow	24 —	—	—
Natural Yellow	25 75310	—	—
Natural Yellow	26 75130	—	—
Natural Yellow	27 75125	—	—
	75135		
Natural Yellow	28 75760	—	—

OXIDATION BASES

New CI Name	New CI No.	Old CI Name	Old CI No.
Oxidation Base	1 50440	Aniline Black	CI 870
Oxidation Base	2 76085	Diphenyl Black Base	CI 871
Oxidation Base	2A 76086	—	—
Oxidation Base	2B 76087	—	—
Oxidation Base	3 —	—	—
Oxidation Base	4 76043	—	—
Oxidation Base	5 —	—	—
Oxidation Base	6 76550	—	—
Oxidation Base	6A 76551	—	—
Oxidation Base	7 76545	—	—
Oxidation Base	8 76075	—	—
Oxidation Base	8A 76076	—	—
Oxidation Base	8B 76077	—	—
Oxidation Base	9A 76021	—	—
Oxidation Base	10 76060	Ursol D, etc	CI 875
Oxidation Base	10A 76061	—	—
Oxidation Base	11 76521	—	—
Oxidation Base	12 76050	—	—
Oxidation Base	12A 76051	—	—
Oxidation Base	13A 76066	—	—
Oxidation Base	14 76055	—	—
Oxidation Base	14A 76056	—	—
Oxidation Base	15 76610	—	—
Oxidation Base	16 76010	—	—
Oxidation Base	17 76520	—	—
Oxidation Base	18 76525	—	—
Oxidation Base	19 76005	—	—
Oxidation Base	20 76035	—	—
Oxidation Base	21 76540	—	—
Oxidation Base	22 76070	—	—
Oxidation Base	23 —	—	—
Oxidation Base	24 —	—	—
Oxidation Base	25 76555	—	—
Oxidation Base	26 76500	—	—
Oxidation Base	27 76090	—	—
Oxidation Base	28 —	—	—
Oxidation Base	29 —	—	—
Oxidation Base	30 —	—	—
Oxidation Base	31 76505	—	—
Oxidation Base	32 76515	—	—
Oxidation Base	33 76605	—	—

PIGMENTS

New CI Name	New CI No.	Old CI Name	Old CI No.
Pigment Black	1 50440	—	—
Pigment Black	2 —	—	—
Pigment Black	3 —	—	—
Pigment Black	4 —	—	—
Pigment Black	5 —	—	—
Pigment Black	6, 7 77266	(Calcopad Black H)	CI 1308
Pigment Black	8 77268	—	—
Pigment Black	9 77267	—	—
Pigment Black	10 77265	—	—
Pigment Black	11 77499	—	—
Pigment Black	12 77543	—	—
Pigment Black	13 77322	—	—
Pigment Black	14 77728	—	—
Pigment Black	15 77403	—	—
Pigment Black	16 77945	—	—
Pigment Black	17 77975	—	—
Pigment Black	18 77011	—	—
Pigment Black	19 77017	—	—
Pigment Blue	1 42595	Victoria Pure Blue BO Lake	Pr 198
Pigment Blue	2 44045	Victoria Blue B Lake	CI 729
Pigment Blue	3 42140	—	—
Pigment Blue	4 —	(Solar Blue GL)	—
Pigment Blue	5 42600	Ethyl Violet Lake	CI 682
Pigment Blue	6 —	—	—
Pigment Blue	7 —	—	—
Pigment Blue	8 42040	—	—
	42140		
Pigment Blue	9 42025	—	—
Pigment Blue	10 44040	—	—
Pigment Blue	11 44040	—	—
Pigment Blue	12 42130	—	—
Pigment Blue	13 —	—	—
Pigment Blue	14 42600	Ethyl Blue Lake	CI 682
Pigment Blue	15 74160	Phthalocyanine Blue (Copper)	Pr 481
Pigment Blue	16 74100	Phthalocyanine Blue (Metal-free)	Pr 482
Pigment Blue	17 74200	—	—
Pigment Blue	18 42770A	—	—
Pigment Blue	19 42750A	—	—
Pigment Blue	20 —	—	—
Pigment Blue	21 69835	Indanthrene Blue BCS	CI 1114
Pigment Blue	22 69810	—	—
Pigment Blue	23 —	—	—
Pigment Blue	24 42090	Erioglaucine Lake	CI 671
Pigment Blue	25 21180	(Diane Blue Pulp B-34)	Pr 699
Pigment Blue	25 21180	(Pigment Blue WNL)	Pr 699
Pigment Blue	26 21185	—	—
Pigment Blue	27 77510	Prussian Blue	CI 1288
	77520		
Pigment Blue	28 77346	—	—
Pigment Blue	29 77007	—	—
Pigment Blue	30 77420	—	—
Pigment Blue	31 77437	—	—
Pigment Blue	32 77365	—	—
Pigment Blue	33 77112	—	—
Pigment Blue	34 77450	—	—
Pigment Blue	35 77368	—	—
Pigment Brown	1 12480	—	—
Pigment Brown	2 12071	(Toner Brown ZUS)	Pr 709
Pigment Brown	3 21010	—	—
Pigment Brown	4 —	—	—
Pigment Brown	5 15800	Brilliant Lake Red R	CI 35
Pigment Brown	6, 7 77491	—	—
	77492		
	77499		
Pigment Brown	8 77727	—	—
	77730		
Pigment Brown	9 77430	—	—
Pigment Brown	10 77227	—	—
Pigment Brown	11 77495	—	—
Pigment Green	1 42040	Brilliant Green Lake	CI 662
Pigment Green	2 42040	—	—
	49010		
Pigment Green	3 41000	—	—
	42040		
Pigment Green	4 42000	Malachite Green Lake	CI 657
Pigment Green	5 —	—	—
Pigment Green	6 —	—	—
Pigment Green	7 74260	Phthalocyanine Green	Pr 483
Pigment Green	8 10006	Pigment Green B	Pr 149
Pigment Green	9 49415	—	—
Pigment Green	10 12775	(Lithosol Fast Yellow 3GD)	Pr 691
Pigment Green	10 12775	(Virescent Gold)	Pr 691
Pigment Green	11 —	—	—
Pigment Green	12 10020	Naphthol Green B Lake	CI 5
Pigment Green	13 74200	—	—
	76603		

New CI Name		New CI No.	Old CI Name	Old CI No.
Pigment Green	14	77199	—	—
		77346		
Pigment Green	15	77520	—	—
		77600		
		77601		
		77603		
Pigment Green	16	77955	—	—
		77525		
		77007		
Pigment Green	17	77288	(Calcopad Green M)	CI 1291
Pigment Green	18	77289	—	—
Pigment Green	19	77335	—	—
Pigment Green	20	77408	—	—
Pigment Green	21	77410	—	—
Pigment Green	22	77412	—	—
Pigment Green	23	77009	—	—
Pigment Green	24	77013	—	—
Pigment Metal	1	77000	—	—
Pigment Metal	2	77440	—	—
Pigment Metal	3	77480	—	—
Pigment Metal	4	77575	—	—
Pigment Metal	5	77860	—	—
Pigment Metal	6	77945	—	—
Pigment Orange	1	11725	Hansa Yellow 3R	Pr 280
Pigment Orange	2	12060	(Ortho Nitraniline Orange)	Pr 697
Pigment Orange	3	12105	—	—
Pigment Orange	4	—	—	—
Pigment Orange	5	12075	(D&C Orange No. 17)	Pr 657
Pigment Orange	5	12075	(Permanent Toner Orange 1080)	Pr 657
Pigment Orange	6	12730	—	—
Pigment Orange	7	15530	—	—
Pigment Orange	8	—	—	—
Pigment Orange	9	—	—	—
Pigment Orange	10	—	(Bright Orange OT-390)	—
Pigment Orange	11	—	(Ceres Orange A)	—
Pigment Orange	12	—	—	—
Pigment Orange	13	21110	Vulcan Fast Orange G	Pr 475
Pigment Orange	14	21165	—	—
Pigment Orange	15	21130	—	—
Pigment Orange	16	21160	(Diane Orange Pulp Y-25)	Pr 663
Pigment Orange	17	15510	—	—
Pigment Orange	18	15970	—	—
Pigment Orange	19	15990	—	—
Pigment Orange	20	77199	—	—
		77196		
Pigment Orange	21	77601	—	—
Pigment Red	1	12070	Paranitraniline Red	CI 44
Pigment Red	2	12310	—	—
Pigment Red	3	12120	Toluidine Red	CI 69
Pigment Red	4	12085	Permanent Red R	Pr 541
Pigment Red	5	12490	Permanent Carmine FB	Pr 398
Pigment Red	6	12090	—	—
Pigment Red	7	12420	—	—
Pigment Red	8	12335	—	—
Pigment Red	9	12460	—	—
Pigment Red	10	12440	—	—
Pigment Red	11	12430	—	—
Pigment Red	12	12385	—	—
Pigment Red	13	12395	—	—
Pigment Red	14	12380	—	—
Pigment Red	15	12465	(Romanesta Red MT-2544)	Pr 701
Pigment Red	16	12500	—	—
Pigment Red	17	12390	—	—
Pigment Red	18	12350	(D&C Red No. 38)	Pr 661
Pigment Red	19	12400	—	—
Pigment Red	20	—	—	—
Pigment Red	21	12300	—	—
Pigment Red	22	12315	Pigment Orange R	CI 68
Pigment Red	23	12355	(Textile Red WD-263)	Pr 708
Pigment Red	24	—	—	—
Pigment Red	25	—	—	—
Pigment Red	26	—	—	—
Pigment Red	27	—	—	—
Pigment Red	28	—	—	—
Pigment Red	29	—	—	—
Pigment Red	30	12330	—	—
Pigment Red	31	12360	—	—
Pigment Red	32	12320	—	—
Pigment Red	33	—	(Bright Red Toner RT-275)	—
Pigment Red	34	—	—	—
Pigment Red	35	—	(Permanent Red FKR)	—
Pigment Red	36	—	(Permanent Red FKB)	—
Pigment Red	37	21205	—	—
Pigment Red	38	21120	Vulcan Fast Red B	Pr 476
Pigment Red	39	21080	—	—
Pigment Red	40	12170	—	—
Pigment Red	41	21200	(Dianisidine Red)	Pr 664
Pigment Red	41	21200	(Electra Red R-128)	Pr 664
Pigment Red	41	21200	(Vulcan Fast Red BBE)	Pr 664
Pigment Red	42	21210	—	—
Pigment Red	43	—	(Naphthol Red M RT-397)	—
Pigment Red	44	—	—	—
Pigment Red	45	—	—	—
Pigment Red	46	—	—	—
Pigment Red	47	—	—	—
Pigment Red	48	15865	Permanent Red 2B	Pr 563
Pigment Red	49	15630	Lithol Red R	CI 189
Pigment Red	50	15500	Lake Red D	CI 214
Pigment Red	51	15580	Helio Red RMT	Pr 112
Pigment Red	52	15860	Lithol Red 2G	CI 166
Pigment Red	53	15585	Lake Red C	CI 165
Pigment Red	54	14830	Helio Bordeaux BL	CI 84
Pigment Red	55	15820	(Cabarine Red MB-6595)	Pr 651
Pigment Red	56	15870	—	—
Pigment Red	57	15850	Lithol Rubine B	CI 163
Pigment Red	58	15825	—	—
Pigment Red	59	—	—	—
Pigment Red	60	16105	Pigment Scarlet 3B	CI 216
Pigment Red	61	24830	—	—
Pigment Red	62	23295	—	—
Pigment Red	63	15880	Lake Bordeaux B	CI 190
Pigment Red	64	15800	Brilliant Lake Red R	CI 35
Pigment Red	65	18020	—	—
Pigment Red	66	18000	—	—
Pigment Red	67	18025	—	—
Pigment Red	68	15525	—	—
Pigment Red	69	15595	—	—
Pigment Red	70	15590	—	—
Pigment Red	71	—	—	—
Pigment Red	72	—	—	—
Pigment Red	73	—	—	—
Pigment Red	74	—	—	—
Pigment Red	75	—	—	—
Pigment Red	76	—	—	—
Pigment Red	77	—	—	—
Pigment Red	78	—	—	—
Pigment Red	79	—	(Ceres Rose GM)	—
Pigment Red	80	†45160	(Helmerco Red 6GC)	†CI 752
Pigment Red	81	45160	Rhodamine 6G Lake	CI 752
Pigment Red	82	45150	—	—
Pigment Red	83	58000	Alizarin VI	CI 1027
Pigment Red	84	58210	Helio Fast Rubine RL	Pr 407
Pigment Red	85	63350	—	—
Pigment Red	86	73375	—	—
Pigment Red	87	73310	(Indo Red MV-6632)	Pr 686
Pigment Red	88	—	—	—
Pigment Red	89	60745	—	—
Pigment Red	90	45380	Eosine Lake	CI 768
Pigment Red	91	—	(Ceres Red A)	—
Pigment Red	92	—	(Ceres Cherry Red A)	—
Pigment Red	93	12152	—	—
Pigment Red	94	—	—	—
Pigment Red	95	—	—	—
Pigment Red	96	—	—	—
Pigment Red	97	—	—	—
Pigment Red	98	—	—	—
Pigment Red	99	15570	—	—
Pigment Red	100	13058	(D&C Red No. 39)	Pr 662
Pigment Red	101	—	—	—
Pigment Red	102	77015	—	—
		77491		
		77538		
Pigment Red	103	77061	—	—
Pigment Red	104	77605	—	—
Pigment Red	105	77578	—	—
Pigment Red	106	77766	—	—
Pigment Red	107	77060	—	—
Pigment Red	108	77196	—	—
Pigment Red	109	77482	—	—
Pigment Violet	1	45170	Rhodamine B Lake	CI 749
Pigment Violet	2	45175	—	—
Pigment Violet	3	42535	Methyl Violet B Lake	CI 680
Pigment Violet	4	42510	—	—
Pigment Violet	5	58055	Helio Fast Rubine 4BL	Pr 406
Pigment Violet	6	58060	—	—
Pigment Violet	7	58065	—	—
Pigment Violet	8	18005	—	—
Pigment Violet	9	—	—	—
Pigment Violet	10	—	(Solar Violet RCL)	—
Pigment Violet	11	—	—	—
Pigment Violet	12	58050	Quinizarin	CI 1028
Pigment Violet	13	—	—	—
Pigment Violet	14	77360	—	—
Pigment Violet	15	77007	—	—
Pigment Violet	16	77742	—	—
Pigment White	1	77597	—	—
Pigment White	2	77633	—	—
Pigment White	3	77630	—	—
Pigment White	4	77947	—	—
Pigment White	5	77115	—	—
Pigment White	6	77891	—	—
Pigment White	7	77975	—	—
Pigment White	8	77847	—	—
Pigment White	9	77245	—	—
Pigment White	10	77099	—	—
Pigment White	11	77052	—	—
Pigment White	12	77990	—	—

† Similar to but not identical.

New CI Name	New CI No.	Old CI Name	Old CI No.
Pigment White	13 77128	—	—
Pigment White	14 77163	—	—
Pigment White	15 77861	—	—
Pigment White	16 77625	—	—
Pigment White	17 77169	—	—
Pigment White	18 77220	—	—
	77713		
Pigment White	19 77005	—	—
Pigment White	20 77019	—	—
Pigment White	21 77120	—	—
Pigment White	22 77120	—	—
Pigment White	23 77120	—	—
	77002		
Pigment White	24 77002	—	—
Pigment White	25 77231	—	—
Pigment White	26 77019	—	—
	77718		
Pigment White	27 77811	—	—
Pigment Yellow	1 11680	Hansa Yellow G	Pr 103
Pigment Yellow	2 11730	—	—
Pigment Yellow	3 11710	Hansa Yellow 10G	Pr 105
Pigment Yellow	4 11665	—	—
Pigment Yellow	5 11660	Hansa Yellow 5G	Pr 104
Pigment Yellow	6 11670	—	—
Pigment Yellow	7 12780	—	—
Pigment Yellow	8 —	—	—
Pigment Yellow	9 11720	—	—
Pigment Yellow	10 12710	—	—
Pigment Yellow	11 10325	—	—
Pigment Yellow	12 21090	Benzidine Yellow	Pr 518
Pigment Yellow	13 21100	Yellow Toner YB-5	Pr 711
Pigment Yellow	13 21100	Vulcan Fast Yellow GR	Pr 479
Pigment Yellow	14 21095	Vulcan Fast Yellow G	Pr 478
Pigment Yellow	15 21220	—	—
Pigment Yellow	16 20040	—	—
Pigment Yellow	17 —	—	—
Pigment Yellow	18 49005	—	—
Pigment Yellow	19 —	(Ceres Yellow A)	—
Pigment Yellow	20 —	—	—
Pigment Yellow	21 —	—	—
Pigment Yellow	22 —	—	—
Pigment Yellow	23 60520	—	—
Pigment Yellow	24 —	—	—
Pigment Yellow	25 —	—	—
Pigment Yellow	26 —	—	—
Pigment Yellow	27 —	—	—
Pigment Yellow	28 —	—	—
Pigment Yellow	29 —	—	—
Pigment Yellow	30 77592	—	—
Pigment Yellow	31 77103	—	—
Pigment Yellow	32 77839	—	—
Pigment Yellow	33 77223	—	—
Pigment Yellow	34 77600	—	—
	77603		
Pigment Yellow	35 77117	—	—
Pigment Yellow	36 77955	—	—
Pigment Yellow	37 77199	—	—
Pigment Yellow	38 77878	—	—
Pigment Yellow	39 77085	—	—
	77086		
Pigment Yellow	40 77357	—	—
Pigment Yellow	41 77588	—	—
	77589		
Pigment Yellow	42 77492	—	—
Pigment Yellow	43 —	—	—
Pigment Yellow	44 77188	—	—
Pigment Yellow	45 77505	—	—
Pigment Yellow	46 77577	—	—
Pigment Yellow	47 77645	—	—
Pigment Yellow	48 77160	—	—

REDUCING AGENTS

New CI Name	New CI No.	Old CI Name	Old CI No.
Reducing Agent	1 —	—	—
Reducing Agent	2 —	—	—
Reducing Agent	3 —	—	—
Reducing Agent	4 —	—	—
Reducing Agent	5 —	—	—
Reducing Agent	6 —	—	—
Reducing Agent	7 —	—	—
Reducing Agent	8 —	—	—
Reducing Agent	9 —	—	—
Reducing Agent	10 —	—	—
Reducing Agent	11 —	—	—

SOLVENT DYES

New CI Name	New CI No.	Old CI Name	Old CI No.
Solvent Black	1 —	—	—
Solvent Black	2 —	—	—
Solvent Black	3 26150	Sudan Black BT	Pr 610
Solvent Black	4 26040	—	—
Solvent Black	5 50415	Nigrosine Spirit Sol	CI 864
Solvent Black	6 —	—	—
Solvent Black	7 50415B	Nigrosine Spirit Sol	CI 864
Solvent Black	8 —	—	—
Solvent Black	9 —	—	—
Solvent Black	10 —	—	—
Solvent Black	11 —	—	—
Solvent Black	12 —	(Azo Oil Black)	—
Solvent Black	12 —	(Azo Oil Blue Black B)	—
Solvent Black	12 —	(Sudan Black BR)	—
Solvent Black	13 —	(Iosol Black)	—
Solvent Black	14 —	(Spirit Soluble Fast Black)	—
Solvent Black	15 —	—	—
Solvent Black	16 —	(Oil Black BG)	—
Solvent Black	17 —	(Luxol Fast Black L)	—
Solvent Black	18 —	—	—
Solvent Black	19 —	Azosol Fast Black M	Pr 487
Solvent Blue	1 —	—	—
Solvent Blue	2 42563B	Victoria Blue 4R (base)	CI 690
Solvent Blue	3 42775	Spirit Blue	CI 689
Solvent Blue	4 44045B	Victoria Blue B (base)	CI 729
Solvent Blue	5 42595B	Victoria Pure Blue B (base)	Pr 198
Solvent Blue	6 44040B	Victoria Blue R (base)	CI 728
Solvent Blue	7 50400	Induline Spirit Sol	CI 860
Solvent Blue	8 52015B	—	—
Solvent Blue	9 —	(Azosol Brilliant Blue B)	—
Solvent Blue	10 —	—	—
Solvent Blue	11 61525	Alizarin Astrol B (base)	CI 1075
Solvent Blue	12 62100	Alizarin Sky Blue B (base)	CI 1088
Solvent Blue	13 62080	Cyananthrol R (base)	CI 1076
Solvent Blue	14 61555	—	—
Solvent Blue	15 —	(Brilliant Oil Blue G)	—
Solvent Blue	16 —	(Brilliant Oil Blue BMA)	—
Solvent Blue	16 —	(Plasto Blue RDA)	—
Solvent Blue	17 —	—	—
Solvent Blue	18 64500	—	—
Solvent Blue	19 —	—	—
Solvent Blue	20 —	(Oil Blue C Supra)	—
Solvent Blue	21 —	—	—
Solvent Blue	22 49705	—	—
Solvent Blue	23 42760	—	—
Solvent Blue	24 74380	—	—
Solvent Blue	25 74360	—	—
Solvent Blue	26 —	—	—
Solvent Blue	27 —	—	—
Solvent Blue	28 —	—	—
Solvent Blue	29 —	(Spirit Soluble Fast Blue B)	—
Solvent Blue	30 —	(Iosol Blue)	—
Solvent Blue	31 —	(Iosol Blue 6G)	—
Solvent Blue	32 —	(Oil Fast Blue R)	—
Solvent Blue	33 —	—	—
Solvent Blue	34 —	(Luxol Fast Blue G)	—
Solvent Blue	35 —	—	—
Solvent Blue	36 —	(Oil Blue A)	—
Solvent Blue	37 —	(Luxol Fast Blue AR)	—
Solvent Blue	38 —	Luxol Fast Blue MBS	Pr 554
Solvent Brown	1 11285	—	—
Solvent Brown	2 11330	—	—
Solvent Brown	3 11360	—	—
Solvent Brown	4 12000	—	—
Solvent Brown	5 12020	—	—
Solvent Brown	6 —	—	—
Solvent Brown	7 —	—	—
Solvent Brown	8 —	—	—
Solvent Brown	9 —	—	—
Solvent Brown	10 —	—	—
Solvent Brown	11 —	(Sudan Dark Brown BG)	—
Solvent Brown	12 21010B	Bismarck Brown R (base)	CI 332
Solvent Brown	13 —	—	—
Solvent Brown	14 —	—	—

New CI Name		New CI No.	Old CI Name	Old CI No.
Solvent Brown	15	—	(Plasto Brown 2RS)	—
Solvent Brown	16	—	(Plasto Red Brown NR)	—
Solvent Brown	17	—	(Luxol Fast Brown R)	—
Solvent Brown	18	—	—	—
Solvent Brown	19	—	(Luxol Fast Brown G)	—
Solvent Brown	20	—	(Luxol Fast Brown K)	—
Solvent Brown	21	—	(Oil Brown M)	—
Solvent Brown	22	—	(Oil Brown N)	—
Solvent Green	1	42000B	Malachite Green (base)	CI 657
Solvent Green	2	—	Luxol Brilliant Green BL	Pr 555
Solvent Green	3	61565	Alizarin Cyanine Green (base)	CI 1078
Solvent Green	4	45550	Fluorol 5G	Pr 542
Solvent Green	5	59075	—	—
Solvent Green	6	59845	—	—
Solvent Green	7	59040	Pyranine Conc	Pr 570
Solvent Green	8	—	—	—
Solvent Green	9	—	—	—
Solvent Green	10	—	(Luxol Fast Green B)	—
Solvent Green	10	—	(Spirit Soluble Fast Green B)	—
Solvent Green	11	—	(Luxol Brilliant Green BL)	—
Solvent Green	12	—	—	—
Solvent Green	13	51005 10445	—	—
Solvent Green	14	—	—	—
Solvent Green	15	42055	—	—
Solvent Orange	1	11920	—	—
Solvent Orange	2	12100	—	—
Solvent Orange	3	11270B	Chrysoidine G (base)	CI 20
Solvent Orange	4	11320B	Chrysoidine R (base)	CI 21
Solvent Orange	5	18745A	Azosol Fast Orange G	Pr 211
Solvent Orange	6	18736A	—	—
Solvent Orange	7	12140	Sudan II	CI 73
Solvent Orange	8	12175	—	—
Solvent Orange	9	11005	—	—
Solvent Orange	10	—	—	—
Solvent Orange	11	—	—	—
Solvent Orange	12	—	—	—
Solvent Orange	13	26075	—	—
Solvent Orange	14	26020	—	—
Solvent Orange	15	46005B	—	—
Solvent Orange	16	45395	—	—
Solvent Orange	17	45456	—	—
Solvent Orange	18	45371	(D&C Orange No. 16)	Pr 656
Solvent Orange	19	—	—	—
Solvent Orange	20	—	Calcofast Spirit Orange RN	Pr 520
Solvent Orange	21	—	(Plasto Orange M)	—
Solvent Orange	22	—	(Plasto Orange RS)	—
Solvent Orange	23	—	(Iosol Orange)	—
Solvent Orange	24	—	(Luxol Fast Orange GS)	—
Solvent Orange	25	—	(Luxol Fast Orange GRL)	—
Solvent Orange	26	—	—	—
Solvent Orange	27	—	—	—
Solvent Orange	28	—	—	—
Solvent Orange	29	—	—	—
Solvent Orange	30	20020	—	—
Solvent Orange	31	—	(Oil Brown Y)	—
Solvent Orange	32	45365	—	—
Solvent Orange	33	—	—	—
Solvent Orange	34	—	—	—
Solvent Red	1	12150	Sudan R	CI 113
Solvent Red	2	12005	—	—
Solvent Red	3	12010	—	—
Solvent Red	4	12170	—	—
Solvent Red	5	11385	—	—
Solvent Red	6	—	—	—
Solvent Red	7	—	—	—
Solvent Red	8	12715	Azosol Fast Red BE	Pr 488
Solvent Red	9	—	—	—
Solvent Red	10	—	—	—
Solvent Red	11	—	—	—
Solvent Red	12	—	—	—
Solvent Red	13	12159	(Plastic Red B)	—
Solvent Red	14	—	—	—
Solvent Red	15	—	—	—
Solvent Red	16	—	—	—
Solvent Red	17	12155	—	—
Solvent Red	18	21260	—	—
Solvent Red	19	26050	—	—
Solvent Red	20	—	—	—
Solvent Red	21	—	—	—
Solvent Red	22	21250	Sudan Red GG	Pr 471
Solvent Red	23	26100	Sudan III	CI 248
Solvent Red	24	26105	Sudan IV	CI 258
Solvent Red	25	26110	—	—
Solvent Red	26	26120	(Oil Red OB)	Pr 696
Solvent Red	26	26120	(Oil Red N 1700) (O-5078)	Pr 696
Solvent Red	26	26120	(Oil Red EGN)	Pr 696
Solvent Red	27	26125	(Oil Red O)	Pr 658
Solvent Red	27	26125	(D&C Red No. 18)	Pr 658
Solvent Red	28	—	—	—
Solvent Red	29	26030	—	—
Solvent Red	30	27291	—	—
Solvent Red	31	27306	—	—
Solvent Red	32	26766	—	—
Solvent Red	33	—	(Azosol Fast Brilliant Red BX)	—
Solvent Red	33	—	(Luxol Fast Red B)	—
Solvent Red	34	—	(Luxol Fast Red BB)	—
Solvent Red	35	16260 45170	Azosol Fast Red 3B	Pr 213
Solvent Red	36	13900 45160	—	—
Solvent Red	37	—	—	—
Solvent Red	38	—	—	—
Solvent Red	39	—	—	—
Solvent Red	40	—	(Sudan Corinth 3B)	—
Solvent Red	41	42510B	—	—
Solvent Red	42	45366	(D&C Red No. 24)	Pr 659
Solvent Red	43	45380A	Eosine G (base)	CI 768
Solvent Red	44	45385	—	—
Solvent Red	45	45386	—	—
Solvent Red	46	45457	—	—
Solvent Red	47	45435A	—	—
Solvent Red	48	45410A	Phloxine B (base)	CI 778
Solvent Red	49	45170B	Rhodamine B (base)	CI 749
Solvent Red	50	—	—	—
Solvent Red	51	—	—	—
Solvent Red	52	68210	Alizarin Rubinol (base)	CI 1091
Solvent Red	53	—	—	—
Solvent Red	54	—	—	—
Solvent Red	55	—	—	—
Solvent Red	56	—	—	—
Solvent Red	57	—	—	—
Solvent Red	58	—	—	—
Solvent Red	59	—	—	—
Solvent Red	60	—	(Oil Pink B)	—
Solvent Red	61	—	—	—
Solvent Red	62	—	—	—
Solvent Red	63	—	(Oil Red RO)	—
Solvent Red	64	—	(Resin Scarlet FL)	—
Solvent Red	65	—	(Plasto Pink MBS)	—
Solvent Red	66	—	(Plasto Scarlet MC)	—
Solvent Red	67	—	(Plasto Red MS)	—
Solvent Red	68	—	(Iosol Red)	—
Solvent Red	69	—	(Spirit Soluble Fast Red M)	—
Solvent Red	69	—	(Luxol Fast Scarlet C)	—
Solvent Red	70	—	(Spirit Soluble Fast Red Y)	—
Solvent Red	71	—	—	—
Solvent Red	72	45370A	(D&C Orange No. 5)	—
Solvent Red	73	45425A	Erythrosine Yellowish (acid form)	CI 772
Solvent Violet	1	12196	—	—
Solvent Violet	2	16055 45170	—	—
Solvent Violet	3	—	—	—
Solvent Violet	4	—	—	—
Solvent Violet	5	—	—	—
Solvent Violet	6	—	—	—
Solvent Violet	7	—	(Iosol Violet)	—
Solvent Violet	8	42535B	Methyl Violet B (base)	CI 680
Solvent Violet	9	42555B	Crystal Violet (base)	CI 681
Solvent Violet	10	45190	Violamine R (base)	CI 758
Solvent Violet	11	61100	—	—
Solvent Violet	12	61105	—	—
Solvent Violet	13	60725	Alizarin Irisol R (base)	CI 1073
Solvent Violet	14	61705	Anthraquinone Violet (base)	CI 1080
Solvent Violet	15	—	—	—
Solvent Violet	16	—	(Plasto Violet MB)	—
Solvent Violet	17	—	(Plasto Violet MR)	—
Solvent Violet	18	—	—	—
Solvent Yellow	1	11000	Amino Azo Benzol	CI 15
Solvent Yellow	2	11020	Oil Yellow	CI 19
Solvent Yellow	3	11160	Amino Azo Toluol	CI 17
Solvent Yellow	4	11350	—	—
Solvent Yellow	5	11380	—	—
Solvent Yellow	6	11390	—	—
Solvent Yellow	7	11800	—	—
Solvent Yellow	8	11810	—	—
Solvent Yellow	9	11870	—	—
Solvent Yellow	10	11840	—	—
Solvent Yellow	11	11850	—	—
Solvent Yellow	12	11860	—	—
Solvent Yellow	13	—	Azosol Fast Yellow R	Pr 517
Solvent Yellow	14	12055	Sudan I	CI 24
Solvent Yellow	15	18820	—	—
Solvent Yellow	16	12700	—	—
Solvent Yellow	17	12770	—	—
Solvent Yellow	18	12740	—	—
Solvent Yellow	19	13900A	Azosol Fast Yellow GR	Pr 216
Solvent Yellow	20	14070	—	—
Solvent Yellow	21	18690	—	—
Solvent Yellow	22	—	Azosol Fast Yellow CGG	Pr 215
Solvent Yellow	23	—	—	—
Solvent Yellow	24	—	—	—
Solvent Yellow	25	—	—	—
Solvent Yellow	26	—	—	—
Solvent Yellow	27	—	—	—
Solvent Yellow	28	20010	—	—
Solvent Yellow	29	21230	Sudan Yellow GRN	Pr 472
Solvent Yellow	30	21240	(Sudan Yellow GRA Conc)	Pr 703
Solvent Yellow	31	—	—	—

New CI Name	New CI No.	Old CI Name	Old CI No.
Solvent Yellow	32	48045 —	—
Solvent Yellow	33	47000 Quinoline Yellow Spirit Sol	CI 800
Solvent Yellow	34	41000B Auramine (base)	CI 655
Solvent Yellow	35	— —	—
Solvent Yellow	36	— —	—
Solvent Yellow	37	— —	—
Solvent Yellow	38	— —	—
Solvent Yellow	39	— (Plasto Yellow GR)	—
Solvent Yellow	40	— (Plasto Yellow MGS)	—
Solvent Yellow	41	— (Plastic Yellow UVF)	—
Solvent Yellow	42	— (Iosol Yellow)	—
Solvent Yellow	43	— (Azosol Brilliant Yellow 8GF)	—
Solvent Yellow	44	— (Azosol Brilliant Yellow 6GF)	†Pr 369
Solvent Yellow	45	— (Luxol Fast Yellow G)	—
Solvent Yellow	45	— (Spirit Soluble Fast Yellow 3G)	—
Solvent Yellow	46	— (Oil Fast Yellow G)	—
Solvent Yellow	46	— (Oil Yellow 2G)	—
Solvent Yellow	47	— (Luxol Fast Yellow T)	—
Solvent Yellow	48	— —	—
Solvent Yellow	49	— —	—
Solvent Yellow	50	— —	—
Solvent Yellow	51	— —	—

† Similar to but not identical.

SULFUR DYES

New CI Name	New CI No.	Old CI Name	Old CI No.
Sulphur Black	1	53185 Sulfur Black T Ex	CI 978
Sulphur Black	2	53195 Sulfur Black R	CI 978
Sulphur Black	3	53180 —	—
Sulphur Black	4	53631 —	—
Sulphur Black	5	53205 —	—
Sulphur Black	6	53295 Indo Carbon CLG	Pr 126
Sulphur Black	7	53300 —	—
Sulphur Black	8	53520 —	—
Sulphur Black	9	53230 —	—
Sulphur Black	10	53190 Sulfur Black BG	CI 978
Sulphur Black	11	53290 Indo Carbon CL	Pr 126
Sulphur Black	12	53200 —	—
Sulphur Black	13	— —	—
Sulphur Blue	1	53235 Pyrogen Blue RRX	CI 956
Sulphur Blue	2	53480 —	—
Sulphur Blue	3	53235 —	—
Sulphur Blue	4	53235 (Sulfur Direct Blue BGF)	—
Sulphur Blue	5	53235 Pyrogen Direct Blue GS	CI 956
Sulphur Blue	6	53460 —	—
Sulphur Blue	7	53440 Immedial Indone	CI 959
Sulphur Blue	8	— (So-Dye-Sul Brilliant Blue 2GBCF)	—
Sulphur Blue	9	53430 Immedial Sky Blue	CI 957
Sulphur Blue	10	53470 Immedial New Blue FBL Ex	Pr 285
Sulphur Blue	11	53235 Pyrogen Direct Blue RL	CI 956
Sulphur Blue	12	53800 —	—
Sulphur Blue	13	53450 Pyrogen Indigo	CI 961
Sulphur Blue	14	53400 —	—
Sulphur Blue	15	53540 Cross Dye Green B	Pr 65
Sulphur Brown	1	53000 Cachou de Laval	CI 933
Sulphur Brown	2	53060 Eclipse Brown B	CI 937
Sulphur Brown	3	— (So-Dye-Sul Olive Yellow YCF)	—
Sulphur Brown	4	53210 —	—
Sulphur Brown	5	53245 —	—
Sulphur Brown	6	53335 —	—
Sulphur Brown	7	53275 —	—
Sulphur Brown	8	53020 —	—
Sulphur Brown	9	— —	—
Sulphur Brown	10	53055 Immedial Orange C	CI 949
Sulphur Brown	11	— —	—
Sulphur Brown	12	53721 Immedial Bordeaux G	CI 1012
Sulphur Brown	13	— —	—
Sulphur Brown	14	53246 Immedial Black Brown A	Pr 545
Sulphur Brown	15	53270 —	—
Sulphur Brown	16	53285 —	—
Sulphur Brown	17	— —	—
Sulphur Brown	18	— —	—
Sulphur Brown	19	53115 —	—
Sulphur Brown	20	53680 —	—
Sulphur Brown	21	53065 —	—
Sulphur Brown	22	53080 —	—
Sulphur Brown	23	53075 —	—
Sulphur Brown	24	53025 —	—
Sulphur Brown	25	— —	—
Sulphur Brown	26	53090 Immedial Yellow D	CI 948
Sulphur Brown	27	— —	—
Sulphur Brown	28	— —	—
Sulphur Brown	29	— Pyrogene Yellow Brown 2RS-CF	Pr 162
Sulphur Brown	30	— (Calcogene Olive Drab YCF)	—
Sulphur Brown	31	53280 —	—
Sulphur Brown	32	— —	—
Sulphur Brown	33	— (Calcogene Brown RBCF)	—
Sulphur Brown	34	— —	—
Sulphur Brown	35	53035 —	—
Sulphur Brown	36	— (So-Dye-Sul Brown PRCF)	—
Sulphur Brown	37	— (So-Dye-Sul Brown FCF)	—
Sulphur Brown	38	53100 —	—
Sulphur Brown	39	— (Sulfogene Cutch MCF)	—
Sulphur Brown	40	— (Sulfogene Olive Drab YCF)	—
Sulphur Brown	41	— —	—
Sulphur Brown	42	53030 —	—
Sulphur Brown	43	— (Sulfur Brown R)	—
Sulphur Brown	44	— (Sulfur Brown RD)	—
Sulphur Brown	45	— (Sulfur Dark Brown R)	—
Sulphur Brown	46	53015 —	—
Sulphur Brown	47	— —	—
Sulphur Brown	48	— —	—
Sulphur Brown	49	— —	—
Sulphur Brown	50	— (Sulfur Red Brown RCF)	—
Sulphur Brown	51	53327 —	—
Sulphur Brown	52	53370 —	—
Sulphur Brown	53	53715 —	—
Sulphur Brown	54	53070 —	—
Sulphur Brown	55	53135 —	—
Sulphur Brown	56	53722 —	—
Sulphur Brown	57	— —	—
Sulphur Brown	58	— —	—
Sulphur Brown	59	— —	—
Sulphur Brown	60	53325 —	—
Sulphur Brown	61	— (Sulfogene Brown RNCF)	—
Sulphur Green	1	53166 (Sulfur Olive G Conc)	Pr 707
Sulphur Green	2	53571 Immedial Green BB	CI 1006
Sulphur Green	3	53570 Immedial Green GG	CI 1006
Sulphur Green	4	— (So-Dye-Sul Liquid Green K)	—
Sulphur Green	5	53550 —	—
Sulphur Green	6	53530 —	—
Sulphur Green	7	53580 —	—
Sulphur Green	8	53175 (Sulfur Olive Drab GD)	Pr 706
Sulphur Green	8	53175 (Sulfur Khaki GCF)	Pr 706
Sulphur Green	9	53005 —	—
Sulphur Green	10	53590 —	—
Sulphur Green	11	53165 Pyrogen Green	CI 1002
Sulphur Green	12	53045 —	—
Sulphur Green	13	— —	—
Sulphur Green	14	— (Sulfogene Brilliant Green J)	—
Sulphur Green	15	— —	—
Sulphur Green	16	— (So-Dye-Sul Liquid Green BGCF)	—
Sulphur Green	17	— (Thional Olive GCF)	—
Sulphur Green	18	53220 —	—
Sulphur Green	19	— —	—
Sulphur Orange	1	53050 (Sulfur Brilliant Orange GR)	†CI 948
Sulphur Orange	2	53145 —	—
Sulphur Orange	3	53105 —	—
Sulphur Orange	4	53152 —	—
Sulphur Red	1	53721 Katigen Red Brown 9RN	CI 1012
Sulphur Red	2	53760 —	—
Sulphur Red	3	53710 —	—
Sulphur Red	4	53730 —	—
Sulphur Red	5	53830 Immedial Red Brown 3R	Pr 702
Sulphur Red	6	53720 Thionone Brilliant Claret 2R	CI 1012
Sulphur Red	7	53810 —	—
Sulphur Red	8	— —	—
Sulphur Violet	1	53410 —	—
Sulphur Violet	2	53760 —	—
Sulphur Violet	3	53780 —	—
Sulphur Violet	4	53700 Immedial Purple C	Pr 546
Sulphur Yellow	1	53040 (Sulfur Yellow GD)	CI 950
Sulphur Yellow	2	53120 Eclipse Yellow	CI 951
Sulphur Yellow	3	53125 Kryogen Yellow G	CI 952
Sulphur Yellow	4	53160 Immedial Yellow GG	CI 955
Sulphur Yellow	5	— —	—
Sulphur Yellow	6	53105 —	—
Sulphur Yellow	7	53037 —	—
Sulphur Yellow	8	53225 —	—
Sulphur Yellow	9	53010 —	—
Sulphur Yellow	10	— (Katigen Yellow CG-CF)	—
Sulphur Yellow	11	— Sulfur Yellow G Ex	Pr 473

† Similar to but not identical.

VAT DYES

New CI Name		New CI No.	Old CI Name	Old CI No.
Vat Black	1	73670/1	Indanthrene Prtg Black BL Suprafix	Pr 295
Vat Black	2	73830/1	—	—
Vat Black	3	—	(Soluble Vat Gray)	—
Vat Black	4	—	—	—
Vat Black	5	—	—	—
Vat Black	6	73661	—	—
Vat Black	7	—	—	—
Vat Black	8	71000	—	—
Vat Black	9	65230	Indanthrene Direct Black RB	Pr 289
Vat Black	10	—	—	—
Vat Black	11	—	(Calcosol Black 2GP)	—
Vat Black	12	—	(Mayvat Gray 2RT)	—
Vat Black	13	—	(Ponsol Direct Black 3G, 3GD)	—
Vat Black	14	—	(Ponsol Gray R)	—
Vat Black	15	—	(Amanthrene Gray BR)	—
Vat Black	16	59855	—	—
Vat Black	17	—	(Calcoloid Gray RD)	—
Vat Black	18	—	(†Carbanthrene Gray GFL)	†Pr 593
Vat Black	19	—	—	—
Vat Black	20	—	—	—
Vat Black	21	—	(Calcosol Printing Black R)	—
Vat Black	22	—	(Calcosol Gray 2G, 2GP)	—
Vat Black	22	—	(Calcoloid Gray 2G)	—
Vat Black	23	65260	—	—
Vat Black	24	—	—	—
Vat Black	25	69525/6	Indanthrene Olive T	Pr 547
Vat Black	26	—	(Carbanthrene Printing Black JN)	—
Vat Black	27	69005	Indanthrene Olive R	CI 1150
Vat Black	28	65010	—	—
Vat Black	29	65225	—	—
Vat Black	30	—	—	—
Vat Black	31	—	—	—
Vat Black	32	—	—	—
Vat Black	33	—	—	—
Vat Blue	1	73000/1/2	Indigo	CI 1177/8
Vat Blue	2	73045/6	—	—
Vat Blue	3	73055/6	—	—
Vat Blue	4	69800/1	Indanthrene Blue RS	CI 1106
Vat Blue	5	73065/6	Indigo MLB/4B	CI 1184
Vat Blue	6	69825/6	Indanthrene Blue BCS	CI 1113 †Pr 502
Vat Blue	7	70305/6	Cibanon Blue 3G	CI 1173
Vat Blue	8	73800/1	—	—
Vat Blue	9	73071	Indigo MLB/5B	CI 1185
Vat Blue	10	69830	—	—
Vat Blue	11	69815	—	—
Vat Blue	12	69840	Indanthrene Blue 3G	CI 1109
Vat Blue	13	69845	—	—
Vat Blue	14	69810	Indanthrene Blue GCD	CI 1112
Vat Blue	15	70010	—	—
Vat Blue	16	71200	Caledon Dark Blue G	Pr 522
Vat Blue	17	—	—	—
Vat Blue	18	59815	Indanthrene Violet RT	CI 1100
Vat Blue	19	59805	—	—
Vat Blue	20	59800	Indanthrene Dark Blue BO	CI 1099
Vat Blue	21	67920	—	—
Vat Blue	22	59820	—	—
Vat Blue	23	—	—	—
Vat Blue	24	—	—	—
Vat Blue	25	70500	—	—
Vat Blue	26	60015	—	—
Vat Blue	27	—	—	—
Vat Blue	28	70005	—	—
Vat Blue	29	74140	Indanthrene Brill Blue 4G	Pr 623
Vat Blue	30	67110	—	—
Vat Blue	31	67105	—	—
Vat Blue	32	67910	Indanthrene Turquoise Blue GK	Pr 548
Vat Blue	33	67915	—	—
Vat Blue	34	73055	—	—
Vat Blue	35	73060	Indigo MLB/2B	CI 1183
Vat Blue	36	73675	—	—
Vat Blue	37	73050	—	—
Vat Blue	38	—	—	—
Vat Blue	39	—	(Indanthrene Blue CLN)	—
Vat Blue	40	73805	—	—
Vat Blue	41	73040	Ciba Blue BR	Pr 528
Vat Blue	42	53640	—	—
Vat Blue	43	53630	Hydron Blue R	CI 969
Vat Blue	44	—	—	—
Vat Blue	45	—	—	—
Vat Blue	46	—	—	—
Vat Blue	47	—	—	—
Vat Blue	48	73075	—	—
Vat Blue	49	—	—	—
Vat Blue	50	—	—	—

† Similar to but not identical.

New CI Name		New CI No.	Old CI Name	Old CI No.
Vat Brown	1	70800/1	Indanthrene Brown B	Pr 118 R
Vat Brown	2	—	—	—
Vat Brown	3	69015/6	Indanthrene Brown R	CI 1151
Vat Brown	4	—	—	—
Vat Brown	5	73410/1	Indanthrene Brown RRD	Pr 121
Vat Brown	6	—	—	—
Vat Brown	7	73406	—	—
Vat Brown	8	70810	—	—
Vat Brown	9	71025	—	—
Vat Brown	10	—	(Mayvat Red Brown RCN)	—
Vat Brown	11	—	(Mayvat Brown UF)	—
Vat Brown	12	—	(Ponsol Brown VR, VRD)	—
Vat Brown	12	—	(†Carbanthrene Brown NR)	—
Vat Brown	13	—	(Mayvat Yellow Brown RC)	—
Vat Brown	14	71120	—	—
Vat Brown	15	—	—	—
Vat Brown	16	70910	—	—
Vat Brown	17	—	—	—
Vat Brown	18	—	—	—
Vat Brown	19	—	—	—
Vat Brown	20	—	Indanthrene Black Brown VA	Pr 622
Vat Brown	21	56016	—	—
Vat Brown	22	71115	—	—
Vat Brown	23	65250	—	—
Vat Brown	24	56010	—	Pr 684
Vat Brown	25	69020	Indanthrene Red Brown 5RF	Pr 448
Vat Brown	26	70510	—	—
Vat Brown	27	—	—	—
Vat Brown	28	—	—	—
Vat Brown	29	—	(Calcoloid Copper Brown)	—
Vat Brown	29	—	(Calcosol Copper Brown)	—
Vat Brown	30	—	—	—
Vat Brown	31	70695	Indanthrene Red Brown R	Pr 447
Vat Brown	32	—	—	—
Vat Brown	33	—	—	—
Vat Brown	34	56010	Helindon Khaki C	Pr 684
Vat Brown	35	—	—	—
Vat Brown	36	—	—	—
Vat Brown	37	56012	—	—
Vat Brown	38	—	—	—
Vat Brown	39	59270	—	—
Vat Brown	40	—	(Ponsol Red Brown RB)	—
Vat Brown	41	—	—	—
Vat Brown	42	73665	—	—
Vat Brown	43	—	(Helindon Yellow Brown CGD)	—
Vat Brown	44	70802	—	—
Vat Brown	45	59500	—	—
Vat Brown	46	70905	—	—
Vat Brown	47	—	—	—
Vat Brown	48	—	—	—
Vat Brown	49	—	—	—
Vat Green	1	59825/6	Caledon Jade Green	CI 1101
Vat Green	2	59830/1	Caledon Jade Green 2G	Pr 632
Vat Green	3	69500/1	Indanthrene Olive Green B	Pr 293
Vat Green	4	59835/6	—	—
Vat Green	5	69520	—	—
Vat Green	6	69855	—	—
Vat Green	7	58825	Indanthrene Olive G	CI 1167
Vat Green	8	71050	Indanthrene Khaki 2G	Pr 122
Vat Green	9	59850	Indanthrene Green B	CI 1102
Vat Green	10	—	—	—
Vat Green	11	69850	—	—
Vat Green	12	70700	—	—
Vat Green	13	—	—	—
Vat Green	14	58830	—	—
Vat Green	15	—	(Carbanthrene Olive G)	—
Vat Green	16	—	—	—
Vat Green	17	69010	—	—
Vat Green	18	—	(Ponsol Blue Green Y)	—
Vat Green	19	—	(Ponsol Olive GGL)	—
Vat Green	20	—	(Ponsol Olive G)	—
Vat Green	21	59051	—	—
Vat Green	22	56015	—	—
Vat Green	23	56011	—	—
Vat Green	24	—	—	—
Vat Orange	1	59105/6	Indanthrene Golden Yellow RK	Pr 292
Vat Orange	2	59705/6	Indanthrene Orange RRT	CI 1098
Vat Orange	3	59300/1	Indanthrene Brilliant Orange RK	Pr 116
Vat Orange	4	59710/1	Indanthrene Orange 4R	Pr 381
Vat Orange	5	73335/6	Helindon Orange R	CI 1217
Vat Orange	6	—	—	—
Vat Orange	7	71105	—	—
Vat Orange	8	—	—	—
Vat Orange	9	59700	Indanthrene Golden Orange G	CI 1096
Vat Orange	10	—	—	—

New CI Name	New CI No.	Old CI Name	Old CI No.
Vat Orange 11	70805	Indanthrene Yellow 3R	Pr 452
Vat Orange 12	—	—	—
Vat Orange 13	67820	—	—
Vat Orange 14	—	—	—
Vat Orange 15	69025	Indanthrene Golden Orange 3G	Pr 290
Vat Orange 16	69540	Indanthrene Orange F3R	Pr 446
Vat Orange 17	65415	—	—
Vat Orange 18	65705	—	—
Vat Orange 19	59305	—	—
Vat Orange 20	65025	—	—
Vat Orange 21	69700	—	—
Vat Red 1	73360/1	Helindon Pink R Ex	Pr 109
Vat Red 2	73365/6	—	—
Vat Red 3	—	—	—
Vat Red 4	—	—	—
Vat Red 5	73350	—	—
Vat Red 6	73355/6	—	—
Vat Red 7	—	—	—
Vat Red 8	—	—	—
Vat Red 9	—	—	—
Vat Red 10	67000/1	Indanthrene Red FBB	Pr 296
Vat Red 11	—	—	—
Vat Red 12	—	(Leucosol Red RL)	—
Vat Red 12	—	(Ponsol Red RL)	—
Vat Red 13	70320	Indanthrene Rubine R Dbl	Pr 124
Vat Red 14	71110	—	—
Vat Red 15	71100	—	—
Vat Red 16	—	(Ponsol Brilliant Red B)	—
Vat Red 17	—	(Indanthrene Scarlet 3GA)	—
Vat Red 18	60705	—	—
Vat Red 19	64015	—	—
Vat Red 20	67100	—	—
Vat Red 21	61670	—	—
Vat Red 22	—	—	—
Vat Red 23	71130	—	—
Vat Red 24	—	—	—
Vat Red 25	—	—	—
Vat Red 26	73340	—	—
Vat Red 27	—	(Ponsol Red RRB)	—
Vat Red 28	65710	—	—
Vat Red 29	71140	Indanthrene Scarlet R	Pr 449
Vat Red 30	56065	—	—
Vat Red 31	—	—	—
Vat Red 32	71135	Algol Scarlet B	Pr 409
Vat Red 33	56050	—	—
Vat Red 34	70330	—	—
Vat Red 35	68000	Indanthrene Red RK	CI 1162
Vat Red 36	—	—	—
Vat Red 37	59310	—	—
Vat Red 38	67810	—	—
Vat Red 39	67900	—	—
Vat Red 40	68300	—	—
Vat Red 41	73300	Thio Indigo Red B	CI 1207
Vat Red 42	61650	—	—
Vat Red 43	—	—	—
Vat Red 44	—	—	—
Vat Red 45	73860	—	—
Vat Red 46	—	—	—
Vat Red 47	73305	—	—
Vat Red 48	65205	—	—
Vat Violet 1	60010/1	Indanthrene Brilliant Violet RR	CI 1104
Vat Violet 2	73385/6	Indanthrene Red Violet RH	CI 1212
Vat Violet 3	73395/6	Indanthrene Red Violet RRN	Pr 503
Vat Violet 4	73400/1	—	—
Vat Violet 5	73595/6	—	—
Vat Violet 6	59316	—	—
Vat Violet 7	59321	—	—
Vat Violet 8	73601	—	—
Vat Violet 9	60005	Indanthrene Brill Violet 3B	CI 1105 Pr 288
Vat Violet 10	60000	—	—
Vat Violet 11	—	—	—
Vat Violet 12	—	(Ponsol Brilliant Violet 3R)	—
Vat Violet 13	68700	Indanthrene Violet BN	CI 1163
Vat Violet 14	67895	Indanthrene Red Violet RRK	CI 1161
Vat Violet 15	63355	—	—
Vat Violet 16	65020	—	—
Vat Violet 17	63365	Indanthrene Brill Violet RK	CI 1135
Vat Violet 18	73605	—	—
Vat Violet 19	52100	—	—
Vat Yellow 1	70600/1	Indanthrene Yellow G	CI 1118
Vat Yellow 2	67300/1	Algol Yellow GC	Pr 9
Vat Yellow 3	61725/6	Indanthrene Yellow GK	CI 1132
Vat Yellow 4	59100/1	Indanthrene Golden Yellow GK	Pr 291
Vat Yellow 5	56005/6	Helindon Yellow CG	CI 1176
Vat Yellow 6	—	—	—
Vat Yellow 7	60531	—	—
Vat Yellow 8	60605	—	—
Vat Yellow 9	66510	Indanthrene Yellow GF	Pr 451
Vat Yellow 10	65430	Indanthrene Yellow GGF	Pr 685
Vat Yellow 11	70405	—	—
Vat Yellow 12	65405	Indanthrene Yellow 3GF	Pr 549
Vat Yellow 13	65425	—	—
Vat Yellow 14	—	—	—
Vat Yellow 15	—	(Calcoloid Fast Yellow)	—
Vat Yellow 15	—	(Calcosol Fast Yellow)	—
Vat Yellow 16	—	(Ponsol Brilliant Yellow 4G)	—
Vat Yellow 17	—	—	—
Vat Yellow 18	66500	—	—
Vat Yellow 19	—	—	—
Vat Yellow 20	68420	—	—
Vat Yellow 21	69705	Cibanon Yellow R	CI 1170
Vat Yellow 22	—	(Ponsol Yellow 5GLL)	—
Vat Yellow 23	65420	—	—
Vat Yellow 24	—	—	—
Vat Yellow 25	—	Indanthrene Yellow 6GD	Pr 550
Vat Yellow 26	65410	—	—
Vat Yellow 27	56080	—	—
Vat Yellow 28	69000	Indanthrene Yellow FFRK	Pr 450
Vat Yellow 29	68400	—	—
Vat Yellow 30	—	—	—
Vat Yellow 31	68405	—	—
Vat Yellow 32	—	(Helindon Yellow WND)	—

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New York Section——

DYEING BLENDS OF DACRON POLYESTER FIBER AND COTTON*

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Dyeing methods for blended yarns and fabrics containing Dacron polyester fiber and cotton are described. Yarns are dyed preferably at elevated temperatures without a carrier using selected disperse dyes for the Dacron; vat dyes are then applied to the cotton by conventional procedures.

When batch dyeing methods are used, fabrics are also preferably dyed under pressure. Nevertheless, they can be satisfactorily dyed in the beck or jig at the boil by the usual carrier procedures.

The Thermosol method for continuous dyeing of fabrics is shown to be highly efficient and practical in mill-scale operation. This method is used to apply selected disperse dyes to the Dacron; vat dyes are then applied to the cotton by either batch or continuous procedures.

Sublimation and vaporization characteristics of the full range of disperse dyes are defined, providing a basis for proper selection of dyes for each of the dyeing methods and end-use requirements.

INTRODUCTION

DURING the past few years Dacron polyester fiber has become firmly established as one of the leading synthetic fibers. The functional and aesthetic qualities imparted to fabrics constructed wholly from Dacron and natural or other synthetic fibers have been recognized by both designers and consumers. It is expected, therefore, that, in the future, increased amounts of Dacron will be utilized, particularly in blends with other fibers.

One of the most important blends is that of 65 percent Dacron and 35 percent cotton. Fabrics made from such a blend have become increasingly popular for the manufacture of items such as shirts, dresses, blouses and pajamas where the ease of care afforded by the presence of the Dacron is of paramount importance to modern consumers. The textile industry as a whole and dyers in particular are faced with the responsibility of dyeing this important blend so that the fastness characteristics of the finished product will be commensurate with the "wash-and-wear" characteristics of the fabric. This means, of course, vat dye fastness.

In this paper, emphasis is placed on the proper selection of disperse dyes for the Dacron, which, with vat dyes for the cotton, produce the desired fastness. The latest application procedures for batch dyeing are reviewed and up-to-date information on continuous dyeing presented.

DYEING OF YARN

DYEING PROCEDURES (*1, 2*) ——The Dacron is dyed first with selected disperse dyes, preferably at 250°F. For heavy shades, it is preferable to drop the bath and scour at 200-225°F with 1.0g/l each caustic soda, an oxidizing agent of the Sitol Flakes type, and a surface-active agent of the Product BCO type in order to insure optimum fastness. Vat dyes are then applied to the cotton component in the usual manner from a fresh bath and the yarn again scoured as previously. For light shades, when rapid means of cooling are available, the temperature can be lowered to 180°F, the vat dyes added directly to the disperse dyebath and the yarn pigmented while cooling to 160°F. Fixation and oxidation of the vat dye are then accomplished in the usual manner and the yarn finally scoured as for heavy shades.

The Dacron can also be dyed at 208°F by the usual carrier methods. However, such procedures are not as economical as high-temperature application and in some cases the dyeings produced exhibit poorer fastness properties. In carrier dyeing a scour is recommended between the application of the two types of dyes regardless of the depth of shade.

Special Procedure for Maroon and Black Shades. For optimum sublimation fastness in maroon and black shades, the insoluble azo dyes are recommended for the Dacron. For example, Latyl Diazo Black B or Acetamine Orange GR Conc 175% (*CI* 11005) applied simultaneously with Latyl Developer B Solution (acidified to pH 5.5) produce satisfactory black and maroon shades respectively (*1,2*). It is emphasized, however, that this procedure can only be used at 250°F without a carrier. At 208°F in the presence of o-phenylphenol (eg, Dowicide A) and other carriers, some precipitation and/or tarring occurs, particularly in the relatively low fiber-to-liquor ratios encountered in package dyeing. The separate application of the base and Latyl Developer B Solution at 208°F is, however, not recommended because the latter exhibits very little affinity for the Dacron at this temperature without a carrier. When it is necessary to dye at 208°F, it is recommended that the base be first applied in the presence of a carrier, and then a developer of the Acetamine Developer AD Extra type be applied in a separate bath followed by simultaneous diazotization and coupling.

Although the use of high temperature and concentration of acid recommended for diazotizing the insoluble azo dyes on Dacron would certainly be hazardous on 100 percent cotton, they have been used successfully in mill-scale dyeings of blended yarns without adversely affecting the physical properties to any significant degree.

PROPER DYE SELECTION (*3*) ——Dyed yarns of Dacron and cotton are usually woven into fancy fabrics with undyed yarns. It is necessary to heat-set such fabrics to obtain dimensional stability to washing and ironing and to render them more resistant to pilling. Most yarn-dyed blends are heat-set for one minute at temperatures in the range of 325-375°F. In order to improve handle of the goods and assist in stabilization of the cotton of these blends, resins are sometimes applied. Zeset S fabric stabilizer, which is representative of the resins employed, requires curing for from one to three minutes at 330°F.

Naturally, the disperse dyes used for dyeing the Dacron must withstand these relatively high finishing temperatures without subliming onto

*Presented by I J Iannarone, Jr before the New York Section April 26, 1957.

A list of trademarks appears at the end of this paper.

the undyed yarns. This goal can now be realized in all shades provided that the proper dye selection, application procedure and finishing conditions are employed.

To determine which of the Du Pont Company's disperse dyes would exhibit satisfactory sublimation fastness under the finishing conditions previously described, 70-g packages of yarns containing 65 percent Dacron and 35 percent cotton, on which flyers of 100 percent spun Dacron and cotton were attached, were dyed at 250°F with individual disperse dyes, subjected to simulated vat dyeing and scoured. Staining of the cotton by each of the disperse dyes used is shown in Table I. To determine the degree of staining which would occur on curing the resin or on heat setting, samples of the dyed and scoured yarns were sewn onto a fabric of 65 percent Dacron and 35 percent cotton adjacent to 100 percent cotton yarns. The finishing treatments to which these samples were subjected and the staining observed are also shown in Table I.

From the data presented in Table I, it can be seen that the following disperse dyes do not cause staining of the undyed yarns when subjected to the finishing conditions: Latyls Yellow YL, Yellow 3G, Orange 3R, Cerise B, Scarlet FS, Blue RL, Blue RB, Blue FL, Brill Blue BG; and Celanthrene Fast Pink 3B. Among others not included in Table I but which have been found to be satisfactory are Latyls Red GFS, Blue 4R, Brill Blue 2G and Celanthrene Violet BGF.

The aforementioned Latyl Diazo Black B and Acetamine Orange GR Conc 175% are also satisfactory when coupled with Latyl Developer B Solution (acidified to pH 5.5) or Acetamine Developer AD Extra.

Care should be used in selecting the concentration of some of the recommended dyes. For example, from the data given in Table I, it is seen that, at 1.0 percent, Latyl Orange 3R exhibits no staining, whereas at 2.0 percent some staining occurs. Obviously, concentrations greater than 1.0-1.5 percent should be avoided in order to obtain minimum staining during the finishing operation. This is true of a number of the recommended dyes.

Although the precise limit has not been determined for each dye, the data given should serve as an effective guide in selecting the proper concentration. Fortunately, the limiting concentration for each dye is sufficiently high so that a full range of heavy shades can be made.

TABLE I
Staining properties of some typical disperse dyes on subjection to finishing conditions

% Dye	CI No.	Cotton stain after scour*	Cured 3 mins at 330° F — No Zeset S C	Cured 3 mins at 330° F — No Zeset S D/C	Cured 3 mins at 330° F — 7.0% Zeset S 15% $MgCl_2$ C	Cured 3 mins at 330° F — 7.0% Zeset S 15% $MgCl_2$ D/C	Treated 1 min at 375° F — no Zeset S C	Treated 1 min at 375° F — no Zeset S D/C
2.0% Latyl Yellow YL	—	5	5	5	5	5	5	5
2.0% " Yellow 3G	—	4	T	4	T	4-3	5	T
1.0% " Orange 3R	—	4	5	5	5	5	5	5
2.0% " Orange 3R	—	T	5	T	5	T	5	T-4
1.0% " Cerise B	—	T	T	4	T	4	T	4
1.0% " Scarlet FS	—	4	5	5	5	5	5	5
2.0% " Scarlet FS	—	3	5	5	5	T	5	5
4.0% " Violet BN	—	4-3	4	2	4	2	4	3
4.0% " Violet BGF	—	4	5	T-4	5	4	5	T
2.0% " Violet 2R	—	T	T	4-3	T	4-3	T	4-3
2.0% " Blue RL	—	5	5	5	5	5	5	5
2.0% " Blue RB	—	4	5	T	5	T	5	T
2.0% " Blue FL	—	T	5	5	5	5	5	5
2.0% " Brill Blue BG	—	4	5	5	5	5	5	5
2.0% Acetamine Yellow CG	11855	T	T	4	4	2	5	T
2.0% " Rubine B	11115	4	3	2-1	4	3	4	4
1.0% Celanthrene Fast Pink 3B	62015	4-3	5	5	T	T-4	5	5

*Final scour 1.0 g/l each caustic soda, Sitol Flakes, Product BCO; 20 mins at 200° F
C—cotton; D/C—Dacron and 35% cotton

Celanthrene Violet EGF has been known to tar when applied from baths containing benzoic acid as a carrier. However, it has been applied successfully in the laboratory and on a limited mill scale at 250°F without a carrier. Results obtained on dyeings at 208°F using Dowicide A as a carrier were equally good, but its use is recommended with caution.

As a check on the above work, a range of shades was made on 70-gram packages of the blended yarn using for the Dacron those dyes which exhibited the least staining in the above tests. The cotton component was then dyed with the proper combination of vat dyes to produce a union shade. Typical formulations for these shades and for satisfactory maroon and black shades are given in Appendix I. Samples of each dyeing were subjected to the tests described in Table II. From these data, it is seen that none of the dyed yarns caused objectionable staining of the undyed yarn when they were subjected to the high-temperature finishing conditions normally used. In addition, fastness of all shades to Du Pont wet pressing (2 minutes at 300°F), hot dry pressing (1 minute at 320°F) and sublimation (1 minute at 375°F) was very good.

Fancy fabrics woven from dyed and undyed yarns of Dacron and cotton are often subjected to chlorine or peroxide bleaching. It has been determined that fastness to the AATCC chlorine test (0.3 percent available chlorine) is acceptable but some staining will occur in the AATCC peroxide bleach test, particularly in heavy shades. More recent laboratory work has shown, however, that staining during continuous peroxide bleaching can be avoided by lowering the temperature in the J box to about 180°F.

All of the laboratory observations on the dyeing of blended yarns have been substantiated in numerous mill-scale dyeings. The production of yarn-dyed fabrics is growing rapidly. It is estimated that one mill alone is producing about 100 combinations in a variety of fabric patterns and constructions.

TABLE II
Fastness ratings for various shades

Shade	AATCC crocking Dry	AATCC crocking Wet	Light (Fade-Ometer) hrs 40	Light (Fade-Ometer) hrs 80	7% Zeset S 15% $MgCl_2$ 3 mins @ 330° F stain D/C	AATCC chlorine test (0.3% available) SC	Peroxide bleach SC	Peroxide bleach C	Peroxide bleach D
White Sand	5	5	3W	2W	5	3W	3-2W	5	5
Pink	5	5	3W	2W	5	4-3BL	3BL	T	T
Light Green	5	5	5	TW	5	4BL, B	4-3BL, B	T	T
Light Brown	T	4	TW	4W	5	4W	TR	4	T
Orange	T	4	5	TW	5	TW	5-4B	4-3	3
Medium Brown	T	3	TY	4YW	T	TW	TW	3	3-2
Medium Blue	T	4	TD	4WD	5	4W	4R	T	T
Light Blue	5	5	5	TW	5	4R, B	TW	5	5
Navy	T	3	5	TR	4-3	4W	4W	4	4
Red	4	3	4-3WD		4	4W, B	4W	4-3	4-3
Green	T	4	5	TW	T	TW	4-3BL	T	4
Dark Gray	T	4	TW	4W	T	4W	4W	4-3	3
Black	4	3-2	5	5	T	4BL	TBL	5	5

T = trace, W = weaker, D = duller, BL = bluer, B = brighter, R = redder, Y = yellower.

DYEING OF FABRICS

Fabrics of Dacron and cotton may be dyed by either batch or continuous procedures. The method depends largely on the equipment available, the depth of shade desired, and the yardage to be processed. Regardless of the method used, combinations of the recommended disperse dyes for the Dacron and vat dyes for the cotton produce dyeings with fastness essentially equal to that of vat-dyed cotton.

AQUEOUS BATCH PROCEDURES (*3,4*)———At temperatures just under 212°F, fabrics are preferably dyed in a beck but can be dyed in a jig. It is recommended that the Dacron be dyed first and then the cotton. By so doing, the caustic soda and reducing agent used in vat dyeing will serve as an effective scour for the dyed Dacron, particularly if the cross dyeing of the cotton is carried out in a jig.

In light shades, if the cotton were dyed first, the shade of a few disperse dyes would be adversely affected by the residual alkali remaining from the vat-dyeing operation. In heavier shades, if it is preferred, the cotton can be dyed first. In the latter instance, if Dowicide A is used as a carrier, the acid required to regenerate the free o-phenylphenol is preferably added to the bath before the carrier. This is done to prevent any serious shade change, which would occur if a few vat dyes were subjected to the strongly alkaline conditions of the carrier bath.

Although the procedures given above refer only to the dyeing of piece goods at 208°F in the presence of a carrier, fabrics can also be dyed at 250°F without a carrier in the Barotor. Also, fabrics up to 9 ounces weight can be dyed in the Burlington Hy-Press Machine (*5*). This machine has been found to be quite useful and economical for dyeing relatively short yardages (about 400 lb). At 250°F, the procedure described for dyeing yarn at high temperatures is employed.

Special Procedure for Black and Maroon. As in the case of yarn dyeing, the insoluble azo dyes offer the most economical means of producing black and maroon shades exhibiting good fastness properties on piece goods. The procedure is similar to that described for yarn dyeing except that under carefully controlled conditions the base and a developer of the Latyl Developer B Solution type can be applied simultaneously at 208°F in the presence of Dowicide A (*2,4*). Either the cotton or the Dacron can be dyed first, whichever is more convenient. The formulations given in Appendix I for the black and maroon shades on yarn are also applicable to the piece goods.

Recommended Disperse Dyes for the Dacron. Although the piece-dyed fabrics may still be subjected to the same finishing treatments as the yarn-dyed fabrics, the solid shades produced in the former eliminate the staining problem. Hence, the sublimation fastness of the disperse dyes used in piece dyeings is not as critical as that of the dyes used in yarns intended for fancy fabrics. Accordingly, in addition to those Du Pont disperse dyes previously recommended for yarn dyeings, others which exhibit satisfactory fastness to sublimation (particularly in low concentrations), can be used in piece dyeing.

DYEING FABRICS OF DACRON AND COTTON BY CONTINUOUS PROCEDURES———Since blends of Dacron and cotton are enjoying widespread popularity and are being processed in increasing quantities, it is only natural that serious attention be given to continuous methods of dyeing.

There are two important procedures for dyeing these fabrics continuously; namely, pad-steam and Thermosol (*6,7,8*). Generally, the continuous dyeing of fabrics of Dacron and cotton falls into three main categories; namely:

1) Pastel shade—Dye cotton only with vat dyes by pad-steam.
2) Light to medium shades—Dye the Dacron only with disperse dyes by the Thermosol method.
3) Medium to heavy shades—Dye both the Dacron and the cotton by the Thermosol and pad-steam or pad-jig procedures.

1) *Pad-Steam Process.* Where sufficient yardages are involved, pastel shades can be made economically by dyeing only the cotton with insoluble or soluble vat dyes by continuous processes. Such dyeings exhibit good coverage particularly in well-blended fabrics. As the depth of shade increases, however, dyeing of the minor cotton component is not sufficient and coverage becomes increasingly poorer. It then becomes necessary to dye the Dacron or both components depending upon the depth of shade desired.

2) *Thermosol Process.* Laboratory work and practical mill experience indicate that the continuous Thermosol method by which the Dacron can be dyed is very promising and will gain in popularity. This procedure is an excellent approach for dyeing large yardages in medium and heavy shades.

The Thermosol process has several distinct advantages over the aqueous batch procedures:

a) A continuous process; hence, large yardages can be dyed economically.
b) No carrier required.
c) Excellent dye utilization.
d) Fabric processed in open width.
e) Simultaneous heat-setting and dyeing.
f) Dyeing not affected by preheat-setting.

Dyeing by the Thermosol process can be accomplished by the following procedure:

The pad bath is prepared by dispersing the required dye (eg, with about 1.0 oz/gal of Compound No. 8S) and diluting to about ½ the desired volume with hot water.

The dispersion is screened or passed through a colloid mill after which 0.15 oz/gal sodium alginate (to increase pickup and control migration) and 0.30 oz/gal of a surface-active agent of the Alkanol WXN type are added. It is then diluted to the desired volume with water.

The fabric is padded at 120°F, partially dried so as to retain about 25 percent moisture, preferably framed about one inch more than the desired finished width, and subjected to a heat treatment at 400-450°F for 15-60 seconds. At the lower temperature, the longer heating time must be used; at the higher temperature, the shorter time is sufficient. The cotton is then dyed by conventional pigment pad-jig or continuous procedures. Typical formulations for a range of shades which can be made by dyeing the Dacron in the blend by the Thermosol process are given in Appendix II.

In order to exercise optimum shade control and to prevent contamination of the equipment, only those disperse dyes which exhibit minimum vaporization in the Thermosol operation should be employed. (At this point, it is necessary to differentiate between vaporization and sublimation. Vaporization is considered to be evaporation of the dye from the surface of the undyed fabric during the dye fixation step while sublimation refers to the evaporation of dye from the fiber after it has been dyed.) With two exceptions, all of the disperse dyes recommended for yarn dyeing exhibit minimum vaporization and are, therefore, recommended for application by the Thermosol process. The exceptions are the insoluble azo dyes, which re-

quire coupling and diazotization for complete shade development. In dyeing by the Thermosol process, the black and maroon shades are preferably made with direct dyeing disperse dyes.

Latyl Scarlet FS and Latyl Cerise B, which in powder form cause severe specking on padding, are available in paste forms which are free from this deficiency.

In dyeing light to medium shades, good coverage can be obtained in properly blended fabrics by dyeing only the Dacron by the Thermosol process, thereby eliminating the vat-dyeing operation. As the depth of shade increases, however, dyeing the major component does not afford sufficient coverage. Consequently, for medium and heavy shades, it becomes necessary to dye both fibers.

Utilization of Disperse Dyes Applied by the Thermosol Process. An important factor to be considered in dyeing by the Thermosol process is the utilization of disperse dyes. Laboratory data based on spectrophotometric determinations indicate that the degree of dye fixation is excellent. Generally, between 75 percent and 90 percent of the originally padded dye is retained by the Dacron in the blend fabric. This is shown in Table III.

Statistically, only about 65 percent of the original dye should have been retained by the Dacron in the blended fabric. The fact that the amount actually retained is considerably higher indicates that most of the dye picked up by the cotton transferred and was fixed onto the Dacron.

The data presented in Table III were further confirmed by making several shades on 65/35 fabric in which equivalent amounts of the disperse dyes were applied to the Dacron b ythe Thermosol process in one case and by the aqueous method using Dowicide A as a carrier in the other. The resultant shades were essentially similar.

Optimum Time and Temperature Required for Thermosol Dyeing. Although fixation of disperse dyes applied to Dacron occurs in 60-90 seconds at temperatures as low as 390°F, where large yardages are involved it may be desirable to achieve more rapid fixation in order that production can be increased.

To establish the optimum time and temperature conditions which would yield a satisfactory rate of production, paddings of selected disperse dyes were made on 100 percent spun Dacron by the Thermosol process in one a laboratory oven at temperatures between 400 and 500°F for from 15 to 60 seconds. One set of dyeings was made without air circulation in the oven; another with maximum air circulation. In either case, it was found that regardless of the dye used, the rate of dye fixation increased with increasing temperatures.

It was also noted that dye fixation, especially at 400°F, was more rapid when the air in the unit was circulated, probably because under these conditions the fabric achieved a higher temperature more rapidly. As the temperature was increased to 450°F, the effect of air circulation in the unit became insignificant so that the degree of dye fixation was essentially similar irrespective of air flow.

At 475-500°F, vaporization of some dyes was aggravated when the air in the unit was circulated; at temperatures up to 450°F, vaporization was not considered serious. Hence, the times and temperatures indicated in Table IV were considered optimum. Thus, at 425°F in a unit which will hold 60 yards of fabric, a production rate of 90-120 yds/min is possible.

To test further the effectiveness of the optimum time and temperatures previously determined, blended fabrics of various weights and constructions were padded with a heavy brown combination, dried and heated for 90 seconds at 400°F (control), 45 seconds at 425 and 30 seconds at 450°F. The cotton in each case was subsequently cross dyed with the same vat dye combination. It was found that for the heavier weight fabric the higher temperature was required for optimum dye fixation.

Effect of Time and Temperature on Fiber Properties. Naturally, the effect of the recommended temperatures on the physical properties of the fiber was important, particularly when it was noted that fabrics of 100 percent spun Dacron which had been treated above the recommended temperature (namely, at 475°F for 45 seconds) felt rather harsh. Accordingly, breaking strength was determined on samples of these fabrics and on a light fabric of Dacron and cotton shirting which had been dyed to a dark brown shade. The results of these tests, which represent an average of 25 breaks on a Suter tester, are summarized in Tables V and VI respectively. From the data it is seen that, in spite of the harshness noted on those fabrics treated at 475°F, the Dacron was not seriously degraded.

Application of Vat Dyes by the Thermosol Process (8). It was originally thought that selected vat dyes which yielded essentially similar shades on both the Dacron and cotton could be applied to the former by the Thermosol process either individually or in combination with disperse dyes to produce medium-to-heavy shades

TABLE III
Utilization of typical disperse dyes applied to Dacron by the Thermosol Process

Dye	Pad conc g/l	% dye owf after padding	65/35 Blend of Dacron and cotton: % of originally padded dye retained after Thermosol	after Thermosol and scouring	on Dacron*
Latyl Yellow YL	20.0	1.19	99.0	93.4	87.5
" Orange 3R	20.0	1.13	99.0	89.2	93.0
" Cerise B	8.0	0.53	98.0	94.5	81.0
	16.0	0.98	98.0	92.0	86.7
	32.0	1.90	87.5	82.5	79.5
" Brill Blue BG	20.0	1.07	98.0	91.5	98.0
Celanthrene Violet BGF	100.0	5.95	100.0	81.0	78.0

*Cotton extracted with 70 percent sulfuric acid (by weight) prior to analysis.

TABLE IV
Times and temperatures required for optimum dye fixation

Temp (°F)	Time (sec)
400	60-90
425	30-45
450	15-30

TABLE V
Effect of time and temperature on physical properties of fabric of 100% spun Dacron

Thermosol conditions: Temp (°F)	Time (sec)	% Loss in breaking strength
400	60	nil
425	60	nil
450	60	2.0
475	60	5.1
500	60	13.3
Control (untreated)		—

TABLE VI
Effect of time and temperature on shirting fabric dyed by the Thermosol method

Thermosol conditions	% Loss
90 sec at 400° F	8.0
45 sec at 425° F	3.5
30 sec at 450° F	8.0

(2). It has since been learned that the caustic soda and reducing agent necessary to develop the vat dyes on the cotton also strip a good portion of these dyes from the Dacron. Hence, unless sufficient disperse dye is included in the formulation to compensate for this loss, a poor union will result particularly in poorly blended fabrics. Accordingly, it has been found to be quite difficult to match and control shades by the above procedure. In addition, due to the relatively poor fixation of most vat dyes applied to Dacron by the Thermosol process, the resultant dyeings exhibit a noticeable shade change when they are subjected to repeated AATCC #3 washings.

Selected vat dyes may be used to produce union pastel-to-light shades (up to 1.0 oz/gal dye). At this relatively low concentration, little or no stripping is encountered in the vat reducing bath.

Effect of Heat Setting on the Dyeability of the Dacron. In view of the effect of heat setting on the dyeability of Dacron when aqueous procedures are employed, it was decided to ascertain the effect of heat setting prior to Thermosol dyeing.

Samples of 65/35 shirting and of 100 percent spun Dacron were heat set for one minute at 390, 400, 425 and 450°F, after which they were padded with a combination of disperse dyes designed to produce a heavy brown shade on the Dacron and dried at 275° F. All fabrics were then Thermosol dyed for 45 seconds at 425°F.

When compared against control dyeings made on fabrics which had not been heat set, all shades produced on the 100 percent Dacron and on the Dacron remaining after the cotton had been extracted from the blend fabric were similar. Hence, heat-setting can be done prior to dyeing by the Thermosol process without adversely affecting the dyeability of the Dacron.

Mill Equipment Required for Dyeing by the Thermosol Process. The equipment required for dyeing by the Thermosol process is readily available in many mills. A good padder is required for uniform application of the disperse dyes. Dry cans or preferably a flue dryer can be used for drying the fabric after it has been padded. Finally, a roller type oven in which temperatures of 400°-450°F are attainable is necessary for the actual dye fixation. For the latter, the usual resin curing ovens have been used to produce very satisfactory dyeings. It is not recommended that dyeing by the Thermosol process be carried out in a clip or pin frame, because the pin or clip marks are evident after dyeing. Preliminary laboratory work indicates that radiant heat units may be employed for Thermosol dyeing *(9)*.

To illustrate the fact that dyeing by the Thermosol process is a practical mill procedure, it is pointed out that at least four mills are dyeing substantial yardages of 65/35 fabrics by this method. The over-all appearance of fastness properties of mill dyeings has been quite satisfactory.

SUMMARY

Laboratory data have been presented which showed that, with proper disperse dye selection, fabrics constructed from dyed and undyed yarns of Dacron and cotton can be finished satisfactorily without encountering serious difficulty with sublimation.

Particular emphasis was placed on continuous procedures for dyeing fabrics of Dacron blended with cotton. These included pad-steam for pastel shades, Thermosol for light-to-medium shades and a combination of Thermosol and pad-steam or pad-jig for the medium to heavy shades.

The data presented for yarn dyeing and for the continuous dyeing of fabrics have been substantiated by numerous large-scale mill dyeings.

ACKNOWLEDGMENT

The work reported in this paper was done in the Organic Chemicals Department and the Textile Fibers Department of the Du Pont Company. The authors wish to express their sincere thanks to all the individuals who have participated and especially to W H McCall, M W Goodell, C W Holweger and F H Laucirica.

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TRADEMARKS

The following are registered trademarks of E I du Pont de Nemours & Co, Inc: Acetamine, Alkanol, Barotor, Celanthrene, Dacron, Latyl, Naphthanil, Ponsol, Sitol, Sulfanthrene, and Zeset.

Dowicide and Keltex are registered trademarks of Dow Chemical Co and Kelco Co respectively.

APPENDIX I

Typical formulations for dyeing yarns of 65% Dacron and 35% cotton

White Sand
0.031% Latyl Orange 3R
0.031% Celanthrene Fast Pink 3B
0.008% Latyl Blue RL
0.031% Ponsol Brown ARN Double Paste
0.062% Ponsol Olive AR Double Paste

Light Green
0.62% Latyl Brilliant Blue BG
0.093% Latyl Yellow YL
0.25% Ponsol Jade Green Supra Double Paste
0.031% Ponsol Blue BF Double Paste

Orange
0.078% Latyl Orange 3R
0.62% Latyl Scarlet FS
4.0% Ponsol Golden Orange 4R Double Paste
1.0% Ponsol Red FG Paste

Medium Blue
1.5% Latyl Blue RL
0.062% Celanthrene Violet BGF
1.75% Ponsol Blue BF Double Paste
0.25% Ponsol Violet BN Supra Double Paste

Navy
2.25% Latyl Blue RL
2.25% Latyl Blue RB
4.1% Latyl Blue 4R
1.1% Latyl Orange 3R
6.12% Ponsol Dark Blue 2G Paste
3.2% Ponsol Direct Black 3G Double Paste

Charcoal
0.5% Latyl Orange 3R
0.5% Latyl Scarlet FS
1.62% Latyl Blue RB
0.62% Latyl Brilliant Blue BG
3.0% Ponsol Gray R Paste
0.5% Ponsol Direct Black 3G Double Paste
0.25% Ponsol Dark Blue 2G Paste

Black
2.25% Latyl Diazo Black B
6.0% Latyl Developer B Solution
12.0% Ponsol Direct Black PC Double Paste

Pink
0.047% Celanthrene Fast Pink 3B
0.01% Latyl Scarlet FS
0.19% Sulfanthrene Pink FFD Paste

Light Brown
0.22% Latyl Orange 3R
0.093% Latyl Scarlet FS
0.14% Latyl Brilliant Blue BG
1.5% Ponsol Brown ARN Double Paste
9.11% Ponsol Golden Orange 3G Paste

Medium Brown
0.45% Latyl Orange 3R
1.125% Latyl Scarlet FS
1.125% Latyl Brilliant Blue BG
0.675% Latyl Blue RB
1.25% Ponsol Golden Orange G Double Paste
10.0% Ponsol Brown VR Paste
0.35% Ponsol Direct Black 3G Double Paste

Light Blue
0.5% Latyl Blue RL
0.016% Celanthrene Violet BGF
0.5% Ponsol Blue BF Double Paste
0.19% Ponsol Violet BN Supra Double Paste

Green

0.5% Latyl Blue BG
0.155% Latyl Orange 3R
1.0% Latyl Yellow YL
0.38% Ponsol Jade Green Supra Double Paste
1.0% Ponsol Yellow 5GLL Paste
0.38% Ponsol Golden Orange G Double Paste

Bright Red

1.75% Latyl Scarlet FS
0.25% Latyl Cerise B
0.75% Latyl Red GFS
1.75% Du Pont Naphthanil SW
1.75% Du Pont Naphthanil Red KBH

Maroon

1.3% Acetamine Orange GR Conc 175%
6.0% Latyl Developer B Solution
1.5% Ponsol Golden Orange RRT Paste
7.0% Ponsol Red 2B Paste
0.6% Ponsol Navy Blue RA Double Paste

APPENDIX II

Formulations for dyeing fabrics of 65% Dacron and 35% cotton by the Thermosol Process

(ALL FORMULATIONS ARE BASED ON 50% PICKUP)

A) Light Shades—Dacron Dyed Only

Gold

15.0 g/l Latyl Yellow YL

Pink

5.0 g/l Latyl Cerise B Paste

Lilac

0.04 g/l Latyl Cerise B Paste
3.0 g/l Celanthrene Violet BGF

Coral

2.0 g/l Latyl Orange 3R
6.0 g/l Latyl Cerise B Paste

Tan

3.0 g/l Latyl Yellow YL
1.0 g/l Latyl Orange 3R
2.0 g/l Latyl Cerise B Paste
5.0 g/l Latyl Blue RL

Turquoise

5.0 g/l Latyl Brilliant Blue BG

B) Medium and Heavy Shades—Dacron and Cotton Both Dyed

Dark Brown

30.0 g/l Latyl Orange 3R
12.0 g/l Latyl Brilliant Blue BG
50.0 g/l Latyl Blue 4R
25.5 g/l Ponsol Golden Orange RRT Paste
135.5 g/l Ponsol Brown VR Paste
70.0 g/l Ponsol Olive T Paste

Royal

40.0 g/l Latyl Blue 4R
5.0 g/l Latyl Brilliant Blue BG
2.0 g/l Latyl Cerise B Paste
66.0 g/l Ponsol Blue BF Double Paste
20.0 g/l Ponsol Brilliant Violet 4RN Paste

Charcoal

25.0 g/l Latyl Blue RL
10.0 g/l Latyl Blue 4R
7.0 g/l Latyl Orange 3R
31.0 g/l Ponsol Direct Black 3G Double Paste
13.0 g/l Ponsol Golden Orange RRT Paste
6.0 g/l Ponsol Navy Blue RA Double Paste

Red

60.0 g/l Latyl Scarlet FS Paste
40.0 g/l Latyl Red GFS
2.0% Du Pont Naphthanil SW
2.0% Du Pont Naphthanil Red KBH

Navy

55.0 g/l Latyl Blue 4R
12.0 g/l Latyl Brilliant Blue BG
10.0 g/l Latyl Orange 3R
43.0 g/l Ponsol Navy Blue RA Double Paste
18.0 g/l Ponsol Golden Orange 3G Paste

Black

82.5 g/l Latyl Blue 4R
9.0 g/l Latyl Brilliant Blue BG
22.5 g/l Latyl Orange 3R
2.5 g/l Latyl Yellow 3G
120.0 g/l Ponsol Direct Black PC Double Paste
20.0 g/l Ponsol Golden Orange RRT Paste

AATCC Calendar

COUNCIL

Nov 14 (Lowell Technological Institute, Lowell, Mass); Jan 24 (New York, NY); May 23 (Philadelphia, Pa); Sept 19, 1958 (Piedmont area)

NATIONAL CONVENTIONS

Nov 14-16, 1957 (Hotel Statler, Boston); Oct 30-Nov 1, 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY)

DELAWARE VALLEY SECTION

Sept 13 (Joint meeting with New York Section at Hotel Hildebrecht, Trenton, NJ); Nov 1 (Kugler's Restaurant, Philadelphia, Pa); Dec 6 (Kugler's Restaurant, Philadelphia, Pa)

HUDSON-MOHAWK SECTION

Oct 4 (Albany, NY); Nov 22 (Johnstown, NY area); Jan 24 (Albany, NY); Mar 28 (Johnstown, NY area); May 16 (Ladies Night); June 20 (Summer outing)

MID-WEST SECTION

October 26 (Bismarck Hotel, Chicago, Ill)

NEW YORK SECTION

Sept 13 (Joint meeting with Delaware Valley Section at Hotel Hildebrecht, Trenton, NJ); Dec 6, Feb 7 (New York, NY); April 11 (New Jersey area)

NIAGARA FRONTIER SECTION

Sept 27 (Buffalo); Oct 25 (Joint meeting with CATCC Ontario Section at St Catherines, Ont); Dec 6, Feb 21 (Buffalo); Apr 4 (Joint meeting)

NORTHERN NEW ENGLAND SECTION

Sept 13 (Outing—Wachusett Country Club, W Boylston, Mass); Dec 6 (Annual meeting, Hotel Continental, Cambridge, Mass)

PIEDMONT SECTION

Sept 27-28 (Annual Meeting—Hotel Barringer, Charlotte, NC)

RHODE ISLAND SECTION

Sept 27 (Ladies Night—Narragansett Hotel, Providence, RI); Oct 24 (Providence Engineering Society, Providence, RI); Dec 5 (Annual Meeting—Johnson's Hummocks Grill, Providence, RI)

SOUTH CENTRAL SECTION

Sept 20 (Hotel Patton, Chattanooga, Tenn)

SOUTHEASTERN SECTION

Sept 13 (Harmony Club, Columbus, Ga); Dec 7 (Atlanta Biltmore Hotel, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION

Sept 27 (Rapp's Restaurant, Shelton Conn); Nov 1 (Annual meeting, Hartford, Conn, area); Dec 13 (Rapp's Restaurant, Shelton, Conn)

Proceedings of the Perkin Centennial

THE Perkin Centennial, held in New York in September 1956, is now a matter of history, but the significance of this noteworthy event is recorded through the medium of a *Book of Proceedings*. This publication, regarded by many as one of the finest contributions to the technical literature of our time, represents one of the most complete and informative documents pertaining to the far-reaching effect of Perkin's discovery of mauve upon the world at large and the dyes and chemicals industry in particular.

Of special interest are the more than sixty papers that were presented at the Centennial, which are published in their original form and contain charts, graphs, structures and descriptive illustrations of the subject under discussion. These touch upon all phases of the use of color in countless industries and are authored by internationally known experts.

The publications contains 468 pages, edited by Howard J White, Jr, Textile Research Institute, and features the following:

- Foreword—by George O Linberg, president, AATCC
- Introduction
- List of Participating Societies and Delegates
- Description of Exhibits featured at the Centennial
- Centennial Program
- Centennial Personnel
- Organization of the Centennial
- Papers and Talks presented at the Centennial
- The Olney Medal Address
- The Perkin Medal Address
- Abstracts of Intersectional Contest Papers, AATCC
- Letters from Heads of Participating Societies on the Significance of Perkin's Contribution
- Acknowledgments

The *Proceedings* is an outstanding reference book that should prove invaluable to anyone interested in the industrial, commercial and aesthetic utilization of color over the past 100 years with a glimpse into the future and its unlimited opportunities for the wider use of color in every-day living.

The book is now being distributed to regular registrants at the Perkin Centennial. Additional copies at $10.00 each can be obtained from George P Paine, executive secretary, AATCC, PO Box 28, Lowell, Mass.

Membership Applications

SENIOR

John Boyd — Chemist, Tennants Textile Colours, Belfast, N Ireland. Sponsors: S Meeker, W W Chase.

Mary E Carter—Research chemist, American Viscose Corp, Marcus Hook, Pa. Sponsors: J A Woodruff, R J Hakim. (DV).

Walter Lakusta — Production supervisor, Dyes Dept, American Cyanamid Co, Bound Brook, NJ. Sponsors: E Wirth, A F Klein. (NY).

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B Brock Williams—Chem sales rep, McKesson & Robbins, Inc, Charlotte, NC. Sponsors: W L Hammond, M W Chappell. (P).

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JUNIOR

Harvey Herman—Vice pres, Service Fabrics, Inc, Passaic, NJ. Sponsors: W H Hughes, W G Wolfgang. (NY).

TRANSFER TO SENIOR MEMBERSHIP

Chester Dziadzio—Lab tech, Waumber Dye & Finish Co, Manchester, NH. Sponsors: A J McNulty, L Zumpfe. (NNE).

Donald J Latta—Chief chem, Cramerton Div of Burlington Industries, Inc, Cramerton, NC. Sponsors: R E Rupp, T E White. (P).

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

57-11

Education: High school; Rhode Island Shool of Design (Chemistry and Dyeing); Extension Courses, MIT, textile testing, microscopy, quality control; LTI, organic chemistry.

Experience: 10 years, dyestuff standardization for dyestuff manufacture; 25 years, chemist, production manager, superintendent for dyer-finisher

Age 58; married; references:

Position desired: Superintendent of corduroy and finishing plant or dyer or chemist in cotton finishing plant

Location desired: New England or Eastern USA; resume on request.

9-9, 9-23

Activities of the Local Sections

Pacific Northwest

THE Pacific Northwest Section held its annual outing August 3, 1957 at Mt Hood Golf & Country Club, Welches, Ore, in the Mt Hood recreational area. Thirty-four members and six guests were in attendance.

The usual golf tournament and horseshoe pitching contests were followed by a cocktail hour and dinner on the patio, after which winners of the various events received their awards and door prizes were drawn.

In the absence of Thomas B Kay, Jr, Thomas Kay Woolen Mill Co, PNW chairman, whose wife presented him with a daughter on July 31st, Bernard R Koenig, vice chairman of the Section, presided.

The following committee handled the outing: Paul J Pernice, General Dyestuff Co, arrangements chairman; Jack Gilberg, General Chemical Div, Allied Chemical & Dye Corp, golf tournament; Dan Gayman, Ciba Co., Inc, awards; and William C Marshall, American Cyanamid Co, horseshoe tournament. It was voted that this committee will again serve for next year's outing.

Winners of the various golf awards were: 1st low gross—E W Kay, Thomas Kay Woolen Mill Co; 2nd low gross—Don E Adams, Portland Woolen Mills; 1st low net — Robert C Pickens, Portland Woolen Mills, 2nd low net—Carl Little and Jack Gilberg; KP on No. 4—Bernard R Koenig; Long driver, No. 2—John L Ayres, E I du Pont de Nemours & Co, Inc; Short driver, No. 11—Robert E Newman, Jantzen Knitting Mills.

C Bouthillier, Jantzen, Inc, took top honors in horseshoe pitching, with R Beaudion, Geigy Dyestuffs, second.

Hudson-Mohawk

THE 9th Annual Outing of the Hudson-Mohawk Section was held on Friday, June 21, 1957 at the Antlers Country Club, Amsterdam, NY, with approximately 117 members in attendance.

Co-chairmen of the outing were Edward A Chevrette, Apex Chemical Co, and Achilles Maflios, Ritter Chemical Co. They were assisted by the following committee members: Floyd J Szurek and Robert G Brown, Mohasco Industries, Inc; Harvey G Gendreau, Sandoz, Inc; William A Nelson, Ritter Chemical Co; Arthur J Bessette, Robert Reise Mfg Co, Inc; Lowell Christman and Irwin J Smith, Surpass Chemical Co; Herbert J Leavitt, General Electric Co; Walter Drautz, General Aniline & Film Corp; and Kennth E Leslie, Ciba Co, Inc.

Among the members, Richard Evans II, Lee Dyeing Co., Inc, took low gross honors in golf. He was followed by Francis A Murphy, Cluett, Peabody & Co, Inc, second; and Arthur W Thomas, A D Julliard & Co, third.

Carson Thompson, Hohasco Industries, Inc, led the nonmembers in golf. He was followed by Dick Ritter, Ritter Chemical Co, second; and Bob Cox, Solvay Process Div, Allied Chemical & Dye Corp, third.

Prizes were also awarded to winners in the horseshoe pitching, badminton, and dart tournaments, in addition to the usual door prizes.

(Outing photos on page P681)

HUDSON-MOHAWK SECTION OUTING

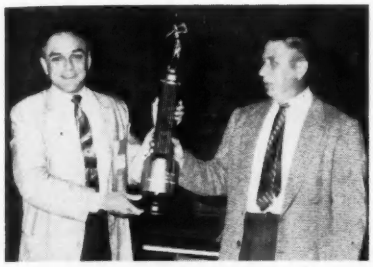
•

June 21, 1957

•

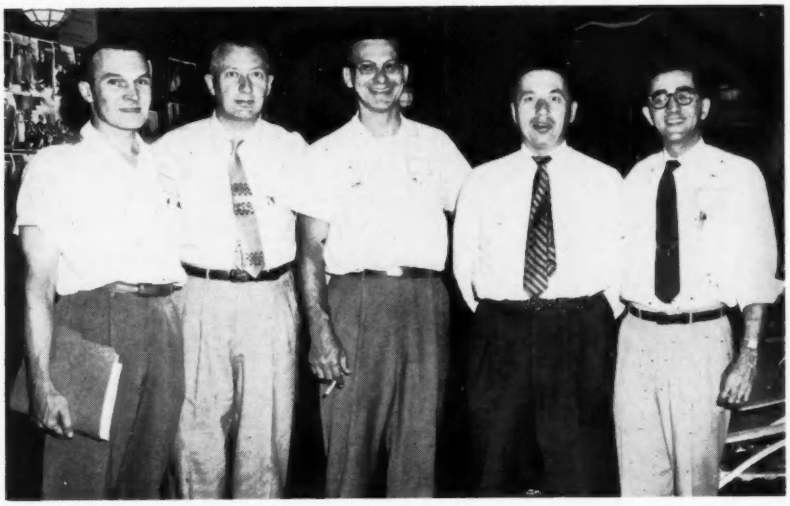
Antlers Country Club,
Amsterdam, NY

(See page P680)



LOW GROSS AWARD: Edmund J Levine, Lee Dyeing Co, Inc, (left) accepts the Ciba Trophy in behalf of Richard Evans, from William A Nelson, golf chairman

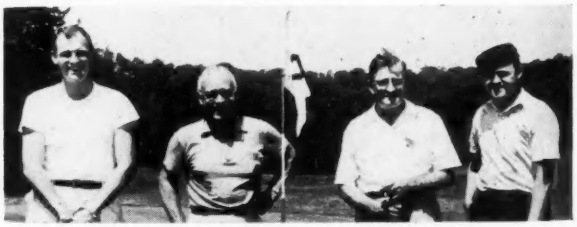
DARTS (l to r): Arthur J Bessette; Lowell Christman; and Jack Tompson, Palatine Dyeing Co



OUTING COMMITTEEMEN (l to r): Floyd J Szurak, Walter Drautz, Edward A Chevrette, William A Nelson, and Achilles Maflios

HORSESHOES (l to r): Ed McGrattan, Mohasco Industries, Inc; Arthur J Bessette; Edward D Wielicka, Columbia Mills, Inc; Edward A Chevrette

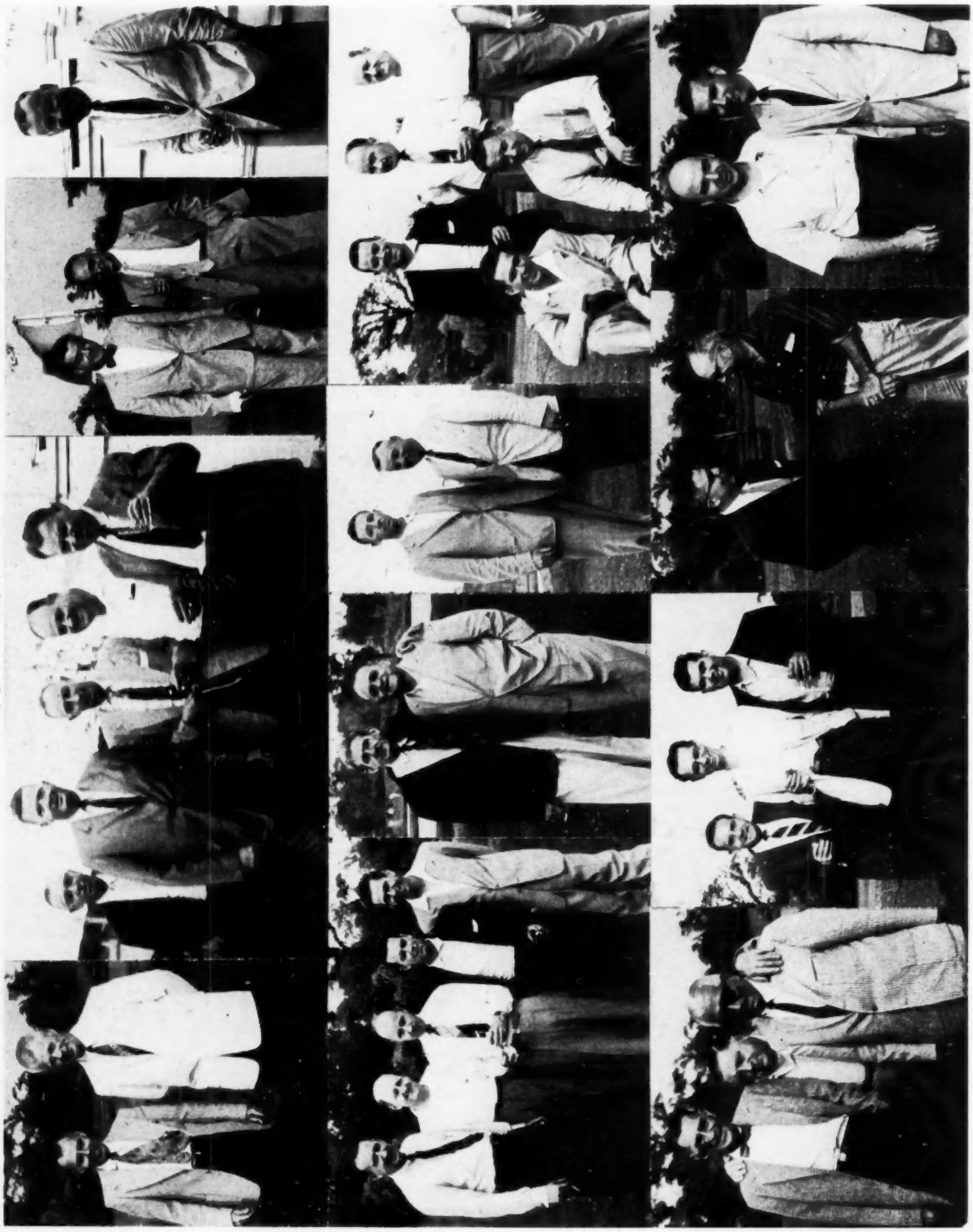
(L to r): Joseph Halleck, Arthur J Bessette, Robert Dobler, Arthur W Thomas, and William A Nelson



GOLF FOURSOME (l to r): Bill Ellsworth, Monsanto Chemical Co; George S Mott, and Albert J Hulsebosch, International Salt Co, Inc; Ed Firebreg, Eastern Chemicals

RHODE ISLAND SECTION OUTING • JUNE 14, 1957 • WARWICK COUNTRY CLUB AND ROCKY POINT, RI

(See page P558 of July 29th issue)



(Photos Courtesy of John E Trezise, Karasell Chemical Co)

News of the Trade

Gaston County Completes Latest Expansion Program

Gaston County Dyeing Machine Co, Stanley, NC, recently completed a new assembly plant consisting of three bays, each 40 feet wide and 275 feet long. All bays are completely covered by the latest type, heavy duty Tramrail hoisting systems. The 20-foot working height under the hoist hooks reportedly will permit the production of all types of heavy equipment.

For 36 years, the Company has specialized in beam, package and raw stock dyeing, bleaching, extracting and drying machinery for the textile industry. The new expansion program is said to be in keeping with the company's aim of continuing and improving its efficiency and service to textile plants.

In addition to conventional pressure extracting and drying equipment, Gaston County produces a new, patented Rapid-Dryer, which employs the closed-system, static-pressure principle In actual yarn mill production the Rapid-Dryer, a completely automatic machine, has proven to be the most efficient machine available for drying packages and cheeses of dyed and bleached yarns, it is claimed. In addition to the advantages of short drying cycles, it reportedly saves labor and is very economical to operate.

In recent years a complete line of Hy-Vacuum pressure autoclaves has been offered to textile plants for steaming and twist-setting natural and synthetic fibers and yarns. These autoclaves, also fully automatic, reportedly have found wide acceptance in yarn mills as well as knitting, weaving and carpet plants. Gaston County is now producing a complete line of stainless-steel machinery for dyeing, bleaching, extracting and drying tricot and open-width cloth. This machinery is available in open and closed types for conventional as well as high-temperature, high-pressure work.

For several years the Company has engaged in the fabrication of custom-designed processing and storage tanks for the chemical and paper industries. These are made of stainless steel, aluminum and other metals. They are built with or without jackets according to customer specifications. Fabricated pipe and pipe assemblies are also produced for these industries.

Tubular heat exchangers, condensers and coils of many designs are available in stainless steel and other metals. These also are custom built to customer requirements and are designed and built according to TEMA and ASME standards.

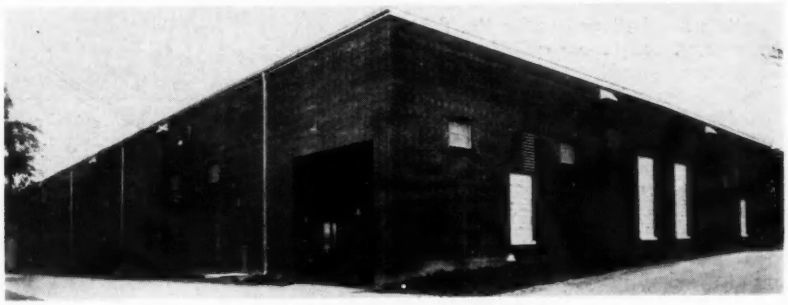
All Gaston County pressure vessels are built under the ASME Code. The new facilities are said to include the most modern welding equipment available for efficient production.

The Engineering Department has been expanded along with new production facilities. The Company's engineers are available for consultation with customers and prospective customers on problems related to design, fabrication or operation of equipment manufactured by the Company.

In addition to the assembly plant, Gaston County has a well-equipped machine shop, which produces centrifugal pumps, special valves, beam heads and other machined parts necessary for their line of products. With the wide range of machine tools available, the shop also does machine work for other manufacturers in the area. Engine lathes, turret lathes, vertical turret lathes and boring mills range from 16″ to 84″.

Gaston County introduced its first automatically controlled dyeing machine on the American market about 20 years ago. Since that time the slogan 'Pioneers in automatically controlled dyeing machines' has keynoted continuous research and development of new and better control systems. The Company boasts an efficient control panel department under the direction of instrument engineers who are able to design control systems for any type of processing equipment.

Gaston County Dyeing Machine Co's office building and machine shop



The Company's new assembly plant

(Photos Courtesy of John E Trezise, Karasell Chemical Co)

Ten-color Printer at GTPFC

A 10-color automatic screen printing machine, manufactured by Comerio Ercole of Italy and sold through that company's sole representatives, Elmo International, 7 Church St, Paterson, NJ, has been delivered to Gsell Textile Printing & Finishing Co for installation at its new plant in East Newark, NJ.

"Color Sells-Yes"

"Color Sells-Yes" is the title of a 4-page bulletin which discusses in detail the successful uses to which Macbeth Daylighting has been put in industries where the critical viewing or matching of colors to standards is a problem. Send to Dept P-8, Macbeth Daylighting Corp, Newburgh, NY. Ask for bulletin #262.

Rayonier Shows 3rd Research Center

Rayonier, Inc, a major chemical cellulose producer, recently unveiled its third and newest research center at Whippany, NJ. The new multimillion dollar research center, known as the Eastern Research Division, is headed by R L Mitchell.

At Whippany, Rayonier is pioneering the injection of trees with radioactive isotopes. Its scientists are also subjecting noncellulosic as well as cellulosic fibers to brutal strength tests. And they're creating new ways to produce superior fibers and film based on cellulose. All this concentrated activity has a prime objective for Rayonier: broader uses for cellulose, and particularly cellulose bearing the Rayonier label.

According to Dr Mitchell, Rayonier scientists are believed to be the first to expose trees to controlled studies based upon radioactivity and to "shoot" them with radioactive material. He described Rayonier's study as "an investment in the future of chemical cellulose as well as a new direction for modern, dynamic conservation." The injection of the trees with radioactive carbon 14 will tag each year's annual growth ring for use in subsequent pioneering research. Later the trees will be felled, de-barked, ground into small chips and end up as chemical cellulose. The radioactive tracers, still present after the numerous mechanical and chemical production steps, will help researchers follow cellulose characteristics and behavior right on through to any end product capable of being reproduced in the laboratory.

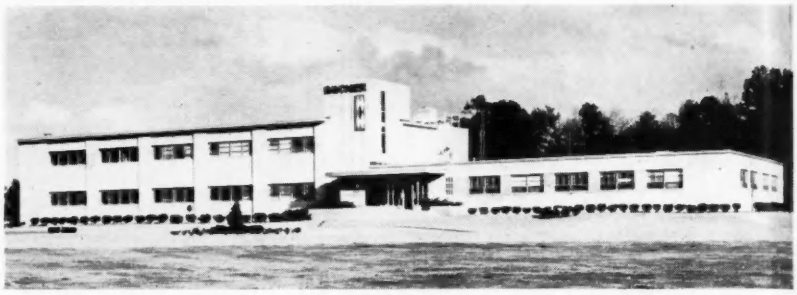
Thus Rayonier foresees the possibility of even further improvements in some of the 500-odd products made from its chemical cellulose, among them rayon, cellophane, tire cord, lacquers, many plastics and acetate.

In describing the objectives of the new research center, Dr Mitchell said they include stimulating "the broader use of cellulosic materials by assisting customers to manufacture more economically new or better fibrous or film-end products."

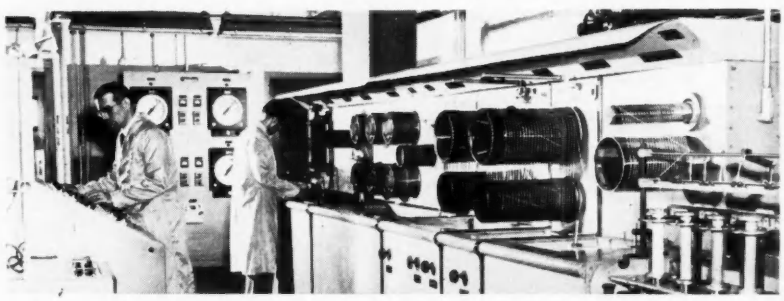
He added that Rayonier's research facilities should help insure that a good share of such products are made from Rayonier chemical cellulose by maintaining top quality and performance characteristics.

Rayonier also maintains other research operations at Shelton, Wash and Vancouver, BC. These work independently on new and improved types of chemical cellulose, silvichemicals and new uses for wood.

At Whippany, research is directed towards several new fields. An initial study currently occupying one of the three major research sections is the production of "truly launderable" rayon fibers. A new experimental rayon spinning machine, designed and built by Rayonier, is in use for producing either high-strength tire yarn or staple fiber for subsequent testing.



Headquarters of Rayonier's new Eastern Research Division at Whippany, NJ



This experimental rayon-spinning machine, designed and built by Rayonier at its new Whippany, NJ, Research Center, is used for producing new high-test tire yarn or staple fiber for research testing

Rayonier has estimated that the consumption of rayon will have increased by 1,000,000,000 lbs within the next five years. Some of this increase will undoubtedly be due to the new chemical celluloses for the new, high-performance rayons. These new launderable rayons will, prophesies Rayonier, find their way into such profiterable markets as sheetings, toweling, shirtings; in short, any market presently claimed almost exclusively by cotton.

Another important study for Rayonier and the cellulose-using industries is the modification of cellulose molecular structure to improve wear characteristics in end-products after conversion from the cellulose raw material.

In one module of the 42,000 sq ft laboratory (thus far the first unit to be completed upon the 82-acre site) all noncellulosic fibers are being tested rigidly to determine their weaknesses as well as their strong (and competitive) points. Thus even silk as a possible potential threat to rayon hi-test tire cord is exposed to the same series of tests undergone by such competitive fibers to rayon as nylon, Orlon, Dacron, glass, cotton and others.

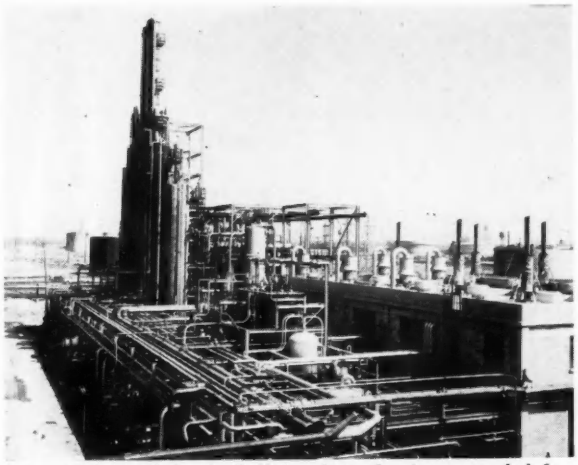
In a heat test devised by Rayonier researchers, rayon's ability to withstand high heat as it can build up in tires at high driving speeds was shown. It is claimed that, whereas the thermoplastic fibers lost about 40% of their strength at 300°F, rayon suffered substantially no loss, thus maintaining its unusual strength characteristics.

Dr Mitchell ackowledged that the severe heat test was created to define more accurately rayon's superior qualities. He observed that tensile strength of the fibers was being tested simultaneously with their heat resistance. "One factor can not fairly be considered without considering the important collateral factor as well," he asserted.

Rayonier's newest research center now numbers 76 people, half being scientifically trained and 10 of whom hold PhD degrees. Research has been broken down into three sections: fiber, film and fundamental. There are also an engineering and office sections.

Semet-Solvay Expands Facilities for Emulsifiable Grade A-C Polyethylene

Facilities for production of Emulsifiable A-C Polyethylene 629 at the Buffalo, NY, plant of the Semet-Solvay Petrochemical Division, Allied Chemical & Dye Corp, have been greatly expanded. This plant produces low molecular weight A-C polyethy-



View of Semet-Solvay's Buffalo plant showing expanded facilities for production of Emulsifiable A-C Polyethylene 629

lene in hot melt and emulsifiable grades.

The product's rapid acceptance and increasing popularity since its introduction two years ago have indicated a need for a boost in production capacity. With the expansion, Semet-Solvay feels that all demands can be met promptly and anticipated future requirements have been amply provided for.

Outstanding characteristics of Emulsifiable A-C Polyethylene are said to be the ease in handling and the fine particle size, stable emulsion it makes. A-C Polyethylene 629 can be handled in anionic, catonic and nonionic systems.

The most rapidly expanding applications for this emulsifiable grade are in the textile industry, namely in finishes and sizing materials. Finishes based on A-C Polyethylene are said to impart improved abrasion and soil resistance, smooth hand, fine drape and better sewability. A-C Polyethylene 629 is used for both natural and synthetic fabrics.

Complete technical information is available from Division headquarters at 40 Rector St, New York 6, NY, giving procedures for preparations of emulsions, starting formulas and typical commercial formulations.

New Ultrasonic Venture

Paul M Platzman, who recently resigned as director and vice president of Acoustica Associates, Inc, has announced the formation of a new, major company in the ultrasonic industry. The new organization, with headquarters in Mineola, NY, will be in operation by mid-September.

According to Mr Platzman, the objective of the new venture will be to provide attractively priced ultrasonic equipment which will be intensively marketed and volume produced.

In addition to catalog and off-the-shelf ultrasonic equipment, which will be sold and rented direct and through distributors, the new company will serve as a source of ultrasonic components for original equipment manufacturers. It will engage in private label manufacture for suppliers in certain fields, and will also offer research and development contract services to the chemical, textile and other industries.

"Moth-safe Fashion Parade"

For the third year in a row, twice-daily fashion shows featuring women's apparel that has been chemically treated to make them safe from possible moth or beetle grubs were held before large audiences at the recently concluded Canadian National Exhibition in Toronto.

The shows, which were held in the afternoon and evening in the new, $15 million air-conditioned Queen Elizabeth Building, were sponsored by Geigy Dyestuffs, Division of Geigy Chemical Corp, developers and manufacturers of Mitin, a durable mothproofing compound which is applied at the mill during the dyeing or other wet finishing stage to raw wool stock, yarn or fabrics. Once applied, all-wool or part-wool fabrics are said to be immune to insect damage for the usable life of the material.

The shows, called "Mitin Moth-Safe Fashion Parade", were staged at the new Fashion Theater in the Queen Elizabeth Building, with approximately 20 manufacturers participating.

The entire stage floor was covered with BMK Mitin-mothproofed carpeting and slings by durably mothproofed blankets were worked into the backdrop.

• NEW PRODUCTS AND DEVELOPMENTS •

Irgalan Black RBL; Irgalan Black GBL

Two shades of black have been added to Geigy's premetallized Irgalan series. They are Irgalan Black RBL, a reddish type which goes considerably redder in artificial light, and GBL, with a greenish cast. Irgalan Black GBL reportedly holds its shade in artificial light, thus providing a constant shade. Both new dyestuffs are recommended by Geigy for wool in all stages of manufacture from raw stock to woven fabric, spun or filament nylon and raw silk. The two materials can be blended to yield a wide variety of shades in the grey-black range (with varying cast under artificial light). They are particularly recommended by Geigy for vigoureux printing.

Geigy cites several properties of these two new dyestuffs which are said to give them decided advantages over competitive products. Their excellent solubility is said to make them ideal for pressure and short liquor ratio applications. High ratio of light-fastness (7-8) in sunlight and Fade-Ometer for both wool and nylon are credited for these two products also. They also are reported to have maximum fastness properties in other areas such as shade change and bleeding in domestic washing at 100° F, decatizing, acid prespiration, alkaline perspiration, dry- and wetcleaning, hot dry pressing, sea water and chlorination.

Giegy points out that, like all other members of the Irgalan series, the two blacks, because of the much shorter application time required over strong acid or chrome colors, provide for lower labor, machine time and steam costs. This same fast-drawing property is said to result in higher fabric quality because the material spends less time in the boiling dyebath and consequently is less subject to deterioration.

Synthravon P

Synthravon P, a recent addition to Arnold, Hoffman & Co, Inc's rang. of textile chemical specialties, is a nonsubstantive softener developed for incorporation into thermosetting resin finishing baths. Arnold, Hoffman states that this "easy-to-use softener can also be used to advantage as a pure finish on cotton and synthetic fabrics."

Characteristics imparted to cottons and synthetics by Synthravon P are said to include high tear strengths, good resistance to washing and dry-cleaning, and excellent resistance to scorching and yellowing. The new softener reportedly does not contribute to chlorine retention damage, and it is said to improve both sewability and crease resistance.

Synthravon P is described as a polyethylene textile softener in the form of a white pourable liquid which is miscible with water in all proportions. Being nonionic in reaction, it is said to be compatible with a wide range of resins and catalysts. It will not develop rancidity in storage or on the fiber, it is claimed.

Amount of Synthravon P required for any given application will depend on the desired effect. Arnold, Hoffman notes. For most applications, it is stated 2% Synthravon P based on the weight of the fiber is adequate. Pad bath concentration should be adjusted in conjunction with the degree of wet pickup, in order to deposit the required amount on the fabric. If possible, application temperatures should be kept below 120°F.

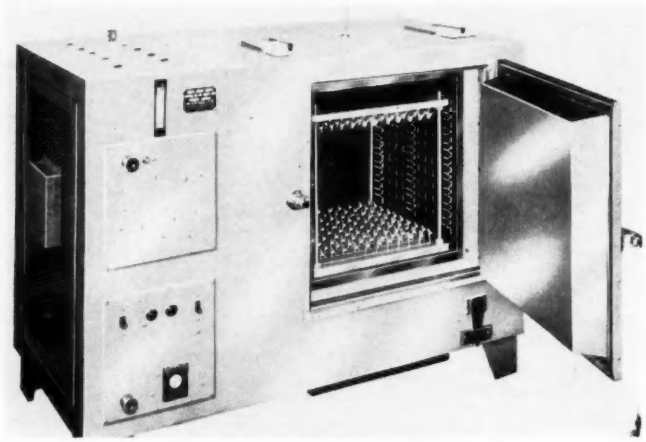
Data are available from Arnold, Hoffman & Company, Inc, Providence, RI.

Con-Wate Mechanical Convection Aging Oven

Designed specifically for certain ASTM tests involving accelerated aging at controlled temperatures for textiles, plastics, etc, Blue M Electric Co's new Con-Wate mechanical convection oven with Power-O-Matic control is now available in a temperature range to 180°C.

From 49 to 240 samples reportedly may be suspended at one time in a special stretch-suspension rack, which has maximum adjustment up or down. Samples are suspended on 1½" centers. The rack may be removed and the oven used as a conventional utility mechanical convection unit.

Power-O-Matic control is said to give fully automatic proportional wattage control, while actually controlling the temperature within ±0.5°C throughout the entire temperature range.



Con-Wate Mechanical Convection Aging Oven

Air is mechanically converted horizontally across the test specimens by a turbo blower and ball-bearing motor. The oven is double wall construction of stainless-steel interior; exterior is a heavy gauge steel painted hammerloid gray enamel. The unit also features a full four inches of Fiberglas insulation on all 6 sides. The Modella heater bank is of low watt density design. The element chamber is separate from the work chamber and heat is transferred to the test specimen only by convected air.

The ovens are manufactured in 4 standard sizes from 1 cubic foot capacity to 10 cubic feet and are ready for power hookup. All wiring is complete and meets National Electrical Code as amended, it is claimed. Standard voltage is 115 Volts 50/60 C A C or 230 V/1 ph 50-60 C A C.

Complete information may be obtained from Blue M Electric Co, Blue Island, Ill.

Improved Bleach J Box Design

Cook Machine Co, Nashua, NH, has introduced some important new features in its J boxes for continuous bleaching, which are said to materially improve the operation of the units and the quality of cloth processed in them. Among the new features is a patent-applied-for change in the shape of the delivery end of the J box, which reportedly allows the dense mass of cloth to loosen and permits it to be withdrawn freely and without rub marks and distortion. Another feature is a patented loading gate, which is said to prevent cloth damage due to tangling when the J box is loaded initially. These features are applicable both the Becco and Du Pont type J boxes.

Model G-1 Moisture Detector

An improved instrument for determining moisture content in cotton bales without opening the bale is currently available through Delmhorst Instrument Co, Boonton, NJ.

The instrument, the Model G-1 Moisture Detector, is equipped with accessory Type 30E Electrode. It is readily portable and battery operated.

Operation consists of forcing the two 8" long contact pins of the 30E Electrode into the bale and then reading the moisture content on the meter. The pins are insulated except at the point to preclude the effects of moisture that might be picked up on the outside of the bale.

Specifications: moisture content range, 6-13%; power supply, self-contained; accuracy, reportedly within 0.5 to 1.0%; size 4½" x 7" x 3¼" (instrument), 8" long (electrode); weight, 4½ lbs net or 5 lbs gr (instrument), 12 oz net or 1 lb gr (electrode); selling price, $100 fob Boonton, NJ.

Sulfonine Navy RWL Pat

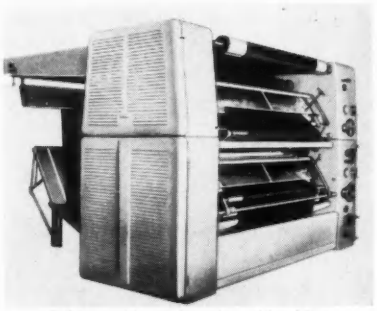
Sulfonine Navy RWL Pat, claimed to be the best dischargeable blue for medium and navy shades on wool or silk, has just been added to the Sandoz line of Sulfonine dyes. Wool and silk dyeings of Sulfonine Navy RWL Pat reportedly possess very good fastness to light, washing, perspiration and water. On silk, its fastness is termed "the best to be had from any bright navy with good dischargeability." Wool dyeings are said to be notable for their excellent fastness to cross-dyeing and acid milling. The shade of Sulfonine Navy RWL Pat dyeings reportedly is uneffected on prolonged boiling treatments.

For further information and pattern cards write to Sandoz, Inc.

New Shearing Machine

Cosa Corporation, 405 Lexington Ave, New York 17, NY, now has available a new, double-head shearing machine which, it is claimed, brings greater speed, accuracy and ease of control to all shearing operations.

In this newly-designed machine, made by Vollenweider Ltd of Switzerland, the shear cylinders remain stationary—rigidly connected to the machine frame. Adjustments for height of shearing and passage of seams are made by raising and lowering the shearing beds. As a result, the high speed cylinders are said to rotate with complete absence of distortion, vibration or free-motion. Shearing height reportedly can be adjusted to an accuracy of .004". Shearing extremely close to the seams is made possible by automatic feed slow-down as seams approach the shear. After the seam passes, normal speed returns.



Vollenweider Shearing Machine

A second design feature is the vertical flow of the cloth through the two shears positioned one above the other. This set-up is said to allow the operator to, without moving, 1) check and adjust shearing beds and height of shearing, 2) check the degree of cutter sharpness and make necessary corrections, and 3) check the overall quality of shearing and make easy immediate corrections. This effectively prevents any occurrence of holes, stripes, unevenness, stairs, etc, it is claimed. Stepless adjustments reportedly permit cloth speeds from 16.5 to 195 ft/min and shearing cylinder speeds from 500 to 1500 rpm. On its last passage the cloth can be sheared at "finish cut," ie, lower cloth speed and lower cylinder rpm. It is stated that standard machines will accept maximum widths up to 63 or 78 inches.

• NAMES IN THE NEWS •

Andruss

Alco Oil & Chemical Corp, Philadelphia, Pa, has elected a new president—**Frank D Andruss,** formerly vice president and general sales manager of General Latex Corp.

During the Korean War, the Government appointed Mr Andruss chief of the Latex Branch, Rubber Div, General Services Administration.

William W Palmquist, formerly manager of sales promotion, has been named chemical products marketing manager by National Carbon Co, Division of Union Carbide Corp. At the same time, the company announced the adoption of the broader term "marketing" to embrace the commercial functions associated with industrial products formerly called "sales".

Mr Palmquist succeeds **C E Ford,** who has been named to the newly created post of new products marketing manager.

Melvin Mark, a registered professional engineer, has been named professor in the department of textile engineering at Lowell Technological Institute.

Kenneth C Towe, since January, 1952, president of American Cyanamid Co, was elected to the newly created post of chairman of the board of directors at the regular quarterly meeting of Directors held on Tuesday, August 20; and **Wilbur G Malcolm,** formerly vice president for Marketing, was elected president and chief executive officer of the Company. Both elections became effective September 1, 1957. At the same meeting, **Kenneth H Klipstein,** vice president, was elected to the board of directors, effective immediately.

H W Bajak has been appointed assistant general sales manager of American Cyanamid Company's Fine Chemicals Division.

Two members of Du Pont's Dyes and Chemicals Division, **Robert F Stevens** and **Thomas A Martone, Jr,** have received new appointments.

Mr Stevens, formerly sales supervisor of the Philadelphia district, has been named manager of industrial chemicals and will be located in Wilmington, Del. He is succeeded by Mr Martone, formerly a salesman of intermediates and dyes in the New York district.

Edward L Carlson, advertising manager of Oakite Products, Inc, 19 Rector St, New York, N Y, has been placed in overall charge of the company's informational efforts in the industrial cleaning and metal finishing fields.

Mr Carlson now represents Oakite on the Exhibitors Advisory Council of New York.

Green

W H & F Jordan, Jr Mfg Co, Inc, Philadelphia, Pa, has appointed **Frederick E Green** technical service representative for its Textile Chemical Div.

For the past five years, Mr Green has been associated with Industrial Rayon Corp.

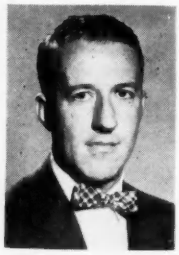
Jerome T Coe has been appointed manager of marketing for the Silicone Products Department, General Electric Co, Waterford NY. He succeeds **T C Ohart,** who has become general manager of General Electric's Insulating Materials Section.

Most recently assigned as sales manager, Mr Coe has been associated with the silicone operation since 1946.

The Velveray Corp, flock processors, has appointed **Ike Cohen** as salesman specializing in Velveray's newly-expanded printing services for fabric converters to the dress and sportswear trade. Mr Cohen was formerly with Halden and Cambridge Textile Processing Companies and the Delaware Dyeing & Finishing Co.

Picciotti

Breagy



Maynard

Eden

A major expansion of sales personnel and technical services has been announced by the Warwick Chemical Division of Sun Chemical Corp. New England and the New York-New Jersey areas are the key territories immediately effected by the expansion. Plans to increase Warwick's sales program in the South are also being studied.

As the first step toward intensifying sales efforts, **A J Picciotti** was promoted to the newly created position of general sales manager. During the past six years, Mr Picciotti has been technical service representative for Warwick Chemical in the New York-New Jersey area.

Under the new arrangement, a team of three technical service representatives have now been appointed to the NY-NJ area. These men are: **William E Breagy, Charles E Conte, Jr,** and **George D Maynard, Jr.**

Mr Breagy joins Warwick after 20 years as a sales representative in the Textile and Paper Dept of Monsanto Chemical Co. Mr Conte since 1955 has been a research chemist in one of Sun Chemical's experimental laboratories. Mr Maynard was formerly a research chemist and technical service representative for Celanese Corp of America.

Liaison between Warwick's sales and technical departments in New York and New Jersey will be supervised by **Louis A Edelman,** who has been appointed technical service manager for the area. Mr Edelman has been associated with both the textile and paper trades in his recent position as a sales service technician for F C Huyck & Sons.

In New England, **Raymond F Pollard** has been appointed district sales manager, and **C A Lamendola** has been promoted to technical sales representative.

Warwick Chemical's increased sales coverage will be further strengthened by expanding facilities and personnel at its Textile Application Laboratory in Wood River Junction, RI. **Steven Nye,** who headed this laboratory for the past five years, has been promoted to the new position of product development manager.

David Koenig will take over as the new manager of the Textile Application Laboratory in Rhode Island. Before joining Warwick, Mr Koeing was engaged in application and development research at United Merchants Corp.

Edelman

Koenig

Frank E Eden, a member of Emery Industries, Inc's control laboratory staff since 1953, has been promoted to the staff of the development and service department of that company.

The following are among the latest scholarship recipients to be named by the School of Textiles, North Carolina State College:

Daniel D Ward and **Olin E Wilson,** $500 Ciba Company Scholarships; **Robert H Pope, Jr, Eddie M Barringer,** and **Duncan D Chappell,** $500 Herman Cone Family Foundation, Inc Scholarships; **Walter K Lynch** and **J C Yancey,** $500 Burlington Industries Foundation Scholarships; and **Harold A Wagner,** $600 American Enka Corp Scholarship.

William G Emory and **Walter W Freed** are among the latest scholarship recipients to be named by Clemson College.

Mr Emory has been awarded a $500 American Viscose Scholarship, while Mr Freed has won the $250 Seydel Woolley & Co Scholarship.

Fritz F Kobayashi, formerly assistant to the director of research and development at the Malden Spinning and Dyeing Co, Lawrence, Mass, has been named assistant professor in the department of fibers and yarns at Lowell Technological Institute.

EMKAY CHEMICALS FOR YOUR TEXTILE PROCESSING

EMKAY MANUFACTURES:

- Emkabase
- Emkacide
- Emkafix
- Emkafol
- Emkagen
- Emkalane
- Emkalar
- Emkalite
- Emkalon
- Emkalube
- Emkanet
- Emkanol
- Emkapel
- Emkapene
- Emkaperm
- Emkapon
- Emkasize
- Emkasol
- Emkatard
- Emkatex
- Emkatol M
- Emkaterge
- Emkawate
- Rexobase
- Rexobond
- Rexoclean
- Rexodull
- Rexofos
- Rexogel
- Rexogum
- Rexole
- Rexolene
- Rexoloid
- Rexolube
- Rexopene
- Rexopon
- Rexoscour
- Rexosolve
- Rexoslip
- Rexowax
- Rexowet

MANUFACTURING CHEMISTS EMKAY CHEMICAL COMPANY EMKA PRODUCTS-REXO

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